RAILROAD GAZETTE

FRIDAY, JULY 20.

CONTENTS.

	Page.
ILLUSTRATIONS:	
Hackensack Drawbridge on the Erie Railroad	469, 471
CONTRIBUTIONS	467
EDITORIALS:	
Locomotive Fire-boxes	474
Railroad Earnings, Gross and Net	475
June Accidents	476
Pig Iron and Blast Furnaces for the First Six Months of 1888	476
EDITORIAL NOTES	474, 476
GENERAL RAILROAD NEWS:	
Meetings and Announcements	480
GENERAL RAILROAD NEWS:	
Personal	481
Elections and Appointments	481
Old and New Roads	481
Traffic and Earnings	482
MISCELLANEOUS:	
Technical	479
Railroad Law	480
The Scrap Heap	479
The Wreck of Browning's Trestle on the Virginia Midland	468
Train Accidents in June	470
Annual Meeting of the Association of Railroad Telegraph Superintendents	472
Some Observations on the Elasticity of Car Wheels, Rails and Road-bed	473
The Arrests at Chicago	478

Contributions.

An Unappreciated Joke.

PITTSBURGH, Pa., July 7, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The sarcasm of the *Locomotive Engineer*, as to the Reading engines, quoted in your last issue, is of so refined a type as to produce upon the ordinary reader that unsatisfactory impression which always results from the consideration of an elaborate and carefully designed joke, without any facilities for the discovery of its point.

Are the new express engines to be discarded because of their great weight; because "they look like locomotives," or because they are "modern;" and, in the latter case, in what particular does their objectionable *modernness* consist? Is a "Wootten fire-box mill" (first built in 1877) more or less *modern* than the new express engines of the ordinary type, with Milholland fire-boxes (first built in 1860), and have the new express engines proven themselves capable of equaling the performance of the "Wootten fire-box mill?"

I submit the above inquiries, not only in the hope of attaining a perfect comprehension and appreciation of the joke of the *Locomotive Engineer*, but also of obtaining some definite information as to the new engines referred to, in which, from a cursory inspection, I have been unable to discern any feature of novelty or any peculiarity beyond their excessive weight.

J. SNOWDEN BELL.

The Master Mechanics' Convention and Coal Burning.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with great interest the report made to the Master Mechanics' Convention by the Committee upon Extension Fronts and Fire-box Arches, as also the discussion that followed. As was aptly put in the Committee's report, mechanics and manufacturers, while giving much consideration to certain matters connected with the improved performance of the steam engine, have paid but little attention to steam generation. The want of interest taken in this class of subjects is also shown clearly, I think, by the fact that only fifteen answers are reported as having been received to all the circulars of inquiry sent out. This indifference on the part of those who should be the most interested has been the great stumbling block in the way of others who have endeavored both in this country and abroad to improve upon the working of steam boilers.

That the coal question is an important one is readily seen from the figures quoted by the Committee, and from the fact that the coal bill usually amounts to from 10 to 12 per cent. of the total operating expenses of a road. A saving of forty per cent. of this amount—which does not seem unreasonable to expect in view of some of the reports presented at the convention—would amount to say three per cent. of the operating expenses, or about two per cent. of the gross earnings, to use moderate figures. If the operating expenses reached a total of a million dollars per year, the saving of two per cent. would be $20,000—a sum certainly worth striving for. When we consider that the road which spends a million dollars a year is no longer considered a very large one, we can readily see to how large a sum of money upon each road the saving of even a moderate percentage of the fuel bill amounts.

Though the replies to the inquiries of the Committee were so meagre, yet the bulk of them, and of the opinions expressed after the presentation of the report, showed that the subject was receiving much more attention than formerly, and though the efforts made were not uniform and were without any co-operation on the part of the roads interested, there being in many cases no data upon which to base systematic research, yet it was apparent to all that the tendency was in a certain direction and that the next time the matter comes up for discussion there will be a larger number who will have actual figures to quote from their own experience. These results will undoubtedly point in the same direction as did the findings of the few who this year were able to show figures of actual tests or records in support of their statements.

The practical results of the report may be summed up as follows: The fire brick arch in its general features was fully indorsed by the convention. The straight stack and extended front end received the approval of the majority of those who have used them. The matter of air admission was left largely in the dark, though those who favored it were, as a rule, quite strong in their preference for the system. Yet all these features are old, and their working might have been passed upon many years ago if the spirit of true inquiry, and a desire to adopt the best features extant in this direction, had existed among our mechanics.

In looking over the reports of various individuals in the Committee's report and the following discussion certain seeming differences are noted, making it at first sight strange that such widely varying results could have been obtained. We must remember, however, that as a rule comparatively little in the way of data was given by those reporting. It is noticeable also that those reporting against the general conclusions reached are supported by the least amount of figures in their statements. There is no question that the more accurately the records are kept in relation to such matters the more the report of the Committee will be sustained. It may be interesting to take in turn the various topics touched upon by the Committee, and comment somewhat upon the conclusions reached.

As regards extension fronts, there is no doubt that they prevent to a greater or less extent throwing fire from the stack, thus avoiding annoyance to passengers and loss from fires set along the road. The saving in cones, stack nettings and linings which is gained through using the extension front is considered by some as fully equal to the additional cost of the extended front. There seemed to be no especial advantage in the steaming powers of the boiler through the extension, neither would such have naturally been expected; but any gain in this respect was clearly traceable to the arrangement of the stack, which in obtaining the best results varied more or less on different roads.

The portion of the report which refers to the brick arch and the discussion afterward showed a decided advance in the matter of soft coal burning as compared with even ten years ago. When close experiments have been made, so that the results could be tabulated, the result is nearly always in favor of the brick arch, which plays the threefold part of lengthening the flameway, promoting the mingling of the coal gases and atmospheric air, and lastly, furnishing a body of heated matter to ignite such mixture. Some of the few cases where objections were made to brick arches were based upon experiments made years ago, when the conditions involved were not so clearly understood as at present, and the results of such experiments should not be used in comparison with carefully calculated tests made at the present day.

When we come to the question of the admission of air above the fire we find that the Committee, as stated before, were not ready to express an opinion from the fact that not sufficient data were at hand to base an opinion upon. Yet this question has been before master mechanics even in the West for over twenty years, and it is not creditable to the profession that more information could not be obtained and placed at the disposal of the Committee. The matter of admitting air above the fire is, of course, a complex matter depending upon the character of coal used, the rate at which it is burned per square foot of grate and the description of fire-box in which it is burned. Undoubtedly the most complete experiments in the early history of air admission in the West were with engines designed after the plans of the late C. F. Jauriet, and to him is due a great deal in the introduction of coal burning upon roads through the prairie states. Mr. Jauriet's fire-box, as is probably well known to the older mechanics of the country, consisted of a metal deflector or "water leg" in the same position that a brick arch is now generally used. He went to greater lengths than any others were willing to do then, or than many are disposed to do now in the matter of air admission over the fire. The arrangement he finally decided upon was to use three rows of hollow stays, ⅝ in. in diameter, around the fire-box and close to the fire line. The area of the tubes in these hollow stays amounted to from $\frac{1}{50}$ to $\frac{1}{40}$ of the total grate area. These boilers gave a high evaporation per pound of coal, averaging over a pound of water per pound of coal more than the plain box without hollow stays. These boilers, with average firing, were absolutely smokeless when working steam, and by using the blower a little any smoke could be avoided when steam was shut off from the cylinders. The grate area, however, was small as compared with modern practice, and the performance, though high compared with the plain box, was not what it would have been with the larger grates and slower draft of to-day. Added to this fault was the fact that the water leg was an expensive construction. Comparative experiments made in 1874 with two engines, each with hollow stays amounting to $\frac{1}{55}$ of the grate area, one engine having a brick arch and the other a water leg, showed a slightly higher evaporation for the brick arch engine, but in no case did any smoke show for more than a second or two when firing either engine. The results of many experiments show the advantage of an ample air supply over the fire both in stationary and locomotive boilers.

The requirements for an economical combustion of soft coals in locomotive boilers seem to be ample grate surface, a thin fire, sufficient air supply above the fire, a perfect admixture of the air above the fire with the burning gases, the requisite temperature to effect the combustion of the mixture, sufficient flame way to allow the thorough combustion of the mixture to be completed before entering the small tubes, an even draft, and heating surface in fire-box and tubes sufficient to absorb the largest amount of heat given out before the products of combustion are carried away by the smoke-stack. Let us see how far these conditions have been complied with in modern practice. We find that the grate areas are being enlarged, and the employment of the straight stack allows larger exhaust nozzles, so that the draft is made more moderate. The value of a thin fire is recognized by all, though there are indications that the increase of grate area has reached its limit, being, in some cases, larger than a man can cover conveniently with a thin fire. The value of the brick deflector, which not only serves as a means for promoting the better mixture of the burning gases with atmospheric air, but is also heated to such a degree that it aids materially in the combustion of such mixture, has gradually come into favor, as its working is better understood, and may be considered as standard on the average American road.

When we come to the question of hollow stays or other devices for admitting air above the line of the fire we find some progress made, but not so much as we would be led to expect. After the period that has elapsed since the use of soft coal in our engines, it is discouraging to find that so little accurate knowledge is obtainable in most quarters, and does not speak well for the zeal of our mechanics in determining questions of this kind. It certainly should be to the interest of every large road to settle this question as soon as possible. There is no doubt that experiments which could be easily and cheaply made upon any road would soon determine the value of this system. There seems no doubt that many of the earlier experimenters who report no gain from the use of hollow stays or air openings were led to their conclusions from the fact that the air admission was comparatively so small that no effect was produced. I have seen, for instance, a single row of ¼-in. hollow stays put into a fire-box to burn a quality of coal that required three rows of ⅝-in. stays to reach the best results. The amount of air to be admitted varies of course with the class of coal burned; the smaller amount being needed in the case of anthracite where there are no hydrocarbons. The admission of air through tubes near the fire line seems to offer certain advantages over the use of a deflector plate at the furnace door, in that the air meets the gases soon after they are evolved from the coal. Systematic experiment should determine clearly the amount of air supply needed for each road according to the character of fuel used.

When we come to the matter of furnishing more room in which to complete combustion before its products enter the tubes, we meet less reliable information. Certain boilers, such as the Wootten and Strong, provide for this need, but in the ordinary soft coal locomotive, even with the brick arch, the flame way is far too short. We see intimations, however, that mechanics are becoming alive to the fact that each additional square foot of fire-box area that can be added is worth much more than a square foot of the tube area at the front end. In consequence it is better to lengthen the fire-box or combustion chamber, even at the expense of some flue surface. It is a well proven fact that the evaporative value of a certain area of the front end of the tubes is much less than that of the fire-box end, and the reason seems to be that the currents of heated air entering the tubes are at first deflected from side to side but finally move in a straight line through the tubes on account of the influence of the draft, and consequently give out less heat through the surrounding metal to the water, though the products of combustion may pass into the stack at a very high heat. From this we can see that there need be no fear of increasing the fire-box or combustion chamber area at the expense of the tube area. If by so doing we get more valuable heating surface it will make up for the net area lost, and by having the products of combustion reach the tubes at a higher temperature a more perfect evaporation will be reached.

To sum up I would consider the most complete boiler for ordinary practice in soft coal to be one having the outside lines of the American standard type. The fire-box would be not over 7 ft. in length, and of whatever width the driving wheels will allow. The air admission will be sufficient for the fuel used, running much higher than in the present average practice. There will be a deflector or wall of fire-brick, and an ample combustion chamber between it and the flue sheet. The tubes will be not over 9 ft. long, so that the present outside boiler lengths will not be exceeded. The stack will be a straight one, and the exhaust nozzles will be of large area. The smoke-box will be a short one, the cinders not being allowed to leave the fire-box. This construction will give a boiler that is reasonable in first cost and simple to repair. The fire will burn comparatively slowly, and inferior fuels can be used. The draft being mild there will be no sparks thrown or waste from the fire being torn up when the engine slips. There being a large area of fire-box and combustion chamber surface, the evaporation will be high, and this condition will be aided from the fact that the combustion being perfect the products will enter the tubes at a high temperature. The perfect combustion will also prevent any smoke. This combination, with ordinary care in firing, will give a degree of efficiency that has seldom been met with to date. I notice that certain of the necessary features have been generally adopted. Who will complete the combination?

It can be seen that there is a harmony between the various parts of this combination, and that each is needed to insure completeness. Without the air supply above the fire we do not get the material to burn the hydro-carbons and carbonic oxide, and they pass the brick arch and combustion chamber unconsumed. If we leave out the brick arch, especially if a strong blast is used, a portion of the atmospheric air may pass over uncombined with the gases, or may pass over at a temperature too low for ignition. If we do not use the combustion chamber the burning gases are quenched upon enter-

ing the tubes, and a portion of the heating power of the fuel is again wasted.

It is safe to say that we are to have, from necessity, better performance as regards useful effect derived from coal burning than we are now getting, and when the locomotive of the future is evolved, there will be regrets that the simplicity of the principles involved were not appreciated sooner and the expenditures of large sums of money avoided.

C. M. HIGGINSON.

English Railroad Speeds.

MANCHESTER, England.

TO THE EDITOR OF THE RAILROAD GAZETTE:

So important have been the changes made in the passenger traffic of all the great English companies, and also so numerous, that "Bradshaw," guide to all British lines, did not appear until the 3d of July. The alterations, of course, as usual, date from July 1, and call for special notice. "Bradshaw" is studied with especial zeal just now by old established travelers, for the numerous changes have quite overthrown their knowledge. All the three companies which conduct a traffic between London and Scotland have added new expresses or increased the speed of existing trains, and the train service between the large towns has also been greatly improved and accelerated. For some time past American superintendents of motive power, and master mechanics, have been priding themselves upon running a good second to their English colleagues, and even venturing to hint that they would soon pass them. Now, however, as usual with all changes in England, the progress there has taken a great step forward, and even the lines south of London, or more properly speaking, of the Thames Valley, are waking up, and the French also have ventured to reduce the time of the Calais and Paris express some fifteen minutes.

The fastest train between London and Edinburgh has hitherto been the Great Northern, 10 a. m., from King's Cross, and it has performed the journey of 396 miles in nine hours. This same train now performs the distance in eight hours and a half, and of this time there are 20 minutes taken up for lunch at York, so that the run is seen to be very excellent indeed. On the other hand, the Northwestern, who have hitherto done the 401 miles between London and Glasgow in ten hours, have knocked off a whole hour, and run the distance in 9 hours, at a speed of 44½ miles per hour, including stoppages, of which they make five, namely, Willesden; Rugby, 5 mins.; Crewe, 7 min.; Preston, 25 min. to dine; Carlisle. Thus, out of the 9 hours there are 37 minutes timed as stoppages, and fully 45 minutes are consumed by the whole five stoppages. Hence, while running, the speed is over 48½ miles per hour. Of the distance of 401 miles, 190 are over the hills of the Lake district and the Scottish Lowlands, but are covered at the same speed, about 47 miles per hour. The Northwestern line has to climb to an elevation of 870 ft. over Shap Fell, and the Caledonian 1,600 ft. at Beattock, with long grades of 70 and 75 ft. to the mile in both cases. The Midland, again, which attains an elevation of 1,500 ft. near the head of the Eden Valley, and has a large number of severe curves and gradients, runs 423 miles between London and Glasgow in 9 hours and 20 minutes. This is really a better performance than that of the Northwestern, for its 10:30 a. m. train stops at Leicester 5 minutes, at Normanton 25 minutes for dinner, and at Carlisle; thus running 22 miles further than its rival in only 20 minutes more time. Of the 60 minutes reduction in time by the Northwestern 10 a. m. from Euston, it is remarkable that the whole of it is taken out of the running time, for the stops are as frequent and as long as before.

The 250 miles between Manchester and Glasgow are completed in 5 hours and 50 minutes, with six stoppages.

Between Manchester and London there are run daily no fewer than forty-two trains, which maintain a speed, including stoppages, of over 40 miles per hour, and as many as twenty-seven similar trains between London and Liverpool. From London to Manchester is 203¼ miles, and the shortest time is 4¼ hours, by the Great Northern, with a climb of 1,000 ft. in Longdendale near Penistone. This run includes a stop of five minutes at Grantham and of four minutes at Sheffield. The time of this train, which leaves London at 2 p. m., is 3 hours and 12 minutes to Sheffield, which is 162¼ miles from London. The speed is thus close upon 51 miles to Sheffield, or, deducting the stop of five minutes at Grantham, over 52 miles per hour, and this allows nothing for the slacking off at stops and the time lost in attaining full speed, this loss being always considerable with the large-wheeled engines used in England.

These fast English expresses are by no means light trains, the Scotch expresses especially are long, fully loaded trains, and the speeds attained with regularity and punctuality as well as economically as regards fuel, ought to receive attention on your side of the Atlantic, where it is the fashion to believe or pretend to believe that English locomotives are inferior machines, and universally provided with rigid wheel base, and unprovided with either bogies (as trucks are here termed) or other means of axle radiation.

The incorrectness of this assumption is shown by the following facts. The three routes to Scotland are worked by the somewhat different types of locomotives owned by four English and three Scotch railways. One company, the London & Northwestern, employ a single pair of wheels in radial guides under the front end of the engine. Another, the Great Northern, use a four-wheel truck with cylindrical centre pin and no lateral motion, and the five others employ the Adams four-wheel bogie, which has practically universal motion, the centre pin being a portion of a sphere and the lateral motion being regulated by adjustable springs, instead of with links as in American trucks. Thus none of the heavy express engines running these important trains have a rigid wheel base.

Of the seven types of locomotives used, two are compound, one is outside connected, and the other four are inside connected. One has a single pair of drivers, one has four drivers but no coupling rods, being on Webb's system, and the other five have four coupled drivers.

Considerable difference of practice exists with regards to the means of enabling the carriages to pass round curves. All the routes use more or less six-wheel carriages, with from 18 to 21 ft. wheel base, the boxes having some lateral motion in the pedestals or axle guards as we call them here. The standard practice of the London & Northwestern is, however, an eight-wheel carriage, the end wheels having a radial motion controlled by springs. The Midland uses American pattern six-wheeled trucks under long passenger carriages, and four-wheeled bogie, with independent semi-elliptical springs above each journal box, dispensing with the heavy equalizer and in some cases with bolster springs. Two other lines use trucks under long carriages only, and the others adhere generally to the six-wheel arrangement as being lighter and simpler, though the motion round curves is not so smooth.

A compound engine of Webb's system, and made by Beyer, Peacock & Co., of Manchester, will soon be tried upon the Pennsylvania. As many of the fastest English trains are run regularly by engines of this type, it will be of interest to note their performance on American lines. Should the engine prove a failure, the cause certainly cannot be laid to the engine in the face of the scheduled speeds in "Bradshaw," which are not merely speeds on paper but represent what is actually performed. Possibly the inferior quality of American coal may be found unequal to supply steam in an English fire-box, which, for the work done, is generally smaller than in America. If this is not the case there can be no reason for failure, apart from unskillful handling. With such an example of speeds before them is it not time that American trains made faster running than they do? England is a small country and yet the English, who work much shorter hours than the Americans do, and must necessarily spend far less time in traveling between their large cities, are not satisfied unless they travel at the very highest possible speed. They certainly waste a half hour in stoppages during a run of 8½ hours, mainly for dining at York. Actually, therefore, they run 400 miles in 8 hours, and so would cover the 900 miles from New York to Chicago in 18 hours, if they would dine on board the train. Traveling in England is very much simpler than in America. The use of sleeping cars is hardly necessary. Every important journey in the country is performed in less than 9 hours, and the majority of the long journeys do not consume 5 hours. Hence sleepers and dining cars are a superfluity, with which few travelers in England care to be annoyed. In the United States they are indispensable, and perhaps their use has had something to do with the slowness of American trains.

W. H. BOOTH.

The Wreck of Browning's Trestle on the Virginia Midland Railroad.

Upon the receipt of a letter from the *Railroad Gazette*, I proceeded at once to the scene of the wreck. The disaster occurred at 2:30 a. m., July 12. When I reached the ground the débris had been cleared away, all useless material had been burned, and the work of rebuilding the trestle was well advanced. The evidence obtainable as to the cause of the wreck had thus been considerably reduced, and the value of the report is limited by this circumstance.

The trestle, known in the vicinity as Browning's trestle, was built about eight years ago, when the closing link was put in the Virginia Midland line between Orange Court House and Charlottesville. This part of the line was constructed as economically and as rapidly as possible, and an unusually large amount of trestling was put in where earth fills would usually have been employed.

This trestle is 2½ miles south of Orange Court House, and crosses a valley about 50 ft. deep on a gentle curve. It is a double-deck structure, the bottom tier containing 26 bays, the upper tier containing 38 bays, each 12.5 ft. long, between the centres of the bents.

The construction of the bents is shown from the accompanying sketch of the highest, made from measures taken on the ground with approximate accuracy. The material was 12 by 12 inch yellow pine. The upper bents had four legs each, two vertical and two battering 2½ in. to the foot. The lower bents had each six legs, two vertical and four battering. Diagonals of 3 by 12 in. stuff were spiked on as usual. The upper bents were in the same vertical plane with the lower, and rested on them with the intervention of four 12 by 12 in. stringers. The lower bents were supported in the same way on a mud sill. The stringers served to brace the bents together, and occasional diagonals were also put in. The timbers were united by mortise and tenon joints and pins. The stringers were gained over the caps.

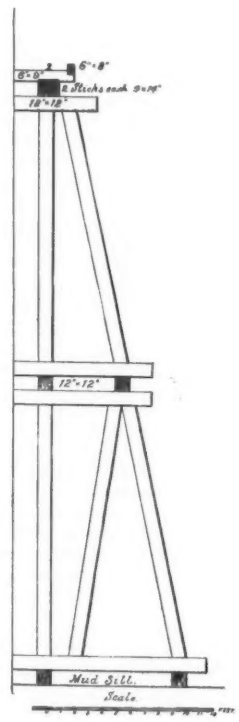
The same sketch shows the construction of the floor system. It consisted of 6×9 in. oak floor beams, 14½ in. between centres, gained over two stringers, each of two sticks of pine, 9×14 in. each. The outside guards were 6×8 in., bolted on to the ends of the floor beams, 15 inches outside of the rails. There was no inner guard rail, nor any device for bringing derailed trucks back to the rails, and the outer guards were too far from the rails to be of any material service except for holding the track in shape.

Assuming the material to be good, the sticks of the trestle would have sustained safely 900 lbs. to the square inch. The total area of section in the four legs is 576 sq. in. If we deduct 14 sq. in. to allow for the obliquity of the outer legs we get for the admissible steady load upon one bent 562 × 900 = 505,800 lbs., or 40,464 lbs. per foot of track, an amount far in excess of the actual requirements, even after allowing for momentum, curve, wind, etc.

For the admissible load upon the floor system we have with an assumed working stress of 1,000 lbs. to the square inch in the stringers $\frac{4}{3} \times 1{,}000 \times 36 \times \frac{14 \times 14}{150} = 62{,}720$ lbs., or 5,018 lbs. per foot of track, an amount ample to cover all the ordinary exigencies of traffic.

I am, of course, able to say nothing as to the material contained in the bents and the portion of the floor which fell. All the crushed and useless material had been destroyed, and only the good sticks were preserved.

The only means which remained for forming a trustworthy opinion as to the state of the wrecked portion was to make an examination of the condition of the bents which remained standing. There were ten of these at each end of the bridge. Those at the south end had been repaired preliminary to the work of filling in the valley with earth, which had already begun at that end. The bents at the north end were in their original condition. In some of these the sappy part of the legs was rotten near the foot. But there was a considerable portion of sound heart even in these, and I could find no bent which seemed in a positively dangerous condition. The state of the stringers which carried the floor seemed decidedly



worse than that of the trestles. These were rotted all along the top, although sound below. I was unable to determine the depth to which this rot extended, as I had no authority to have the damaged portions of the sticks cut away.

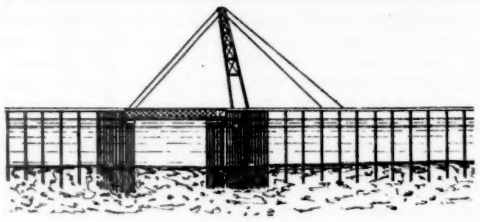
The load under which the bridge gave way was an ordinary passenger train of locomotive, tender, baggage car, express car, smoker, coach and three Pullmans. The locomotive passed over to the south end safely. Marks on the cross ties near the north end seem to indicate that one car truck left the rails about 6 ft. north of the north end of the bridge, and was drawn bumping over the floor beams, every one of which, up to the point of the break, shows the marks made by the wheel flanges. The left-hand wheels ran about 6 in. to the right of the left-hand rail, while the right-hand wheels ran between the right-hand rail and the guard. This car was probably the smoker, as is indicated in several ways that need not be particularized here.

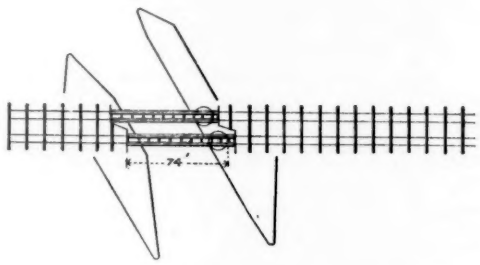
The impulsive action of the load doubtless more than doubled the straining action due to the load itself, which was about 2,500 lbs. to the foot of track. It is impossible now to say whether the wreck occurred in consequence of a break in the floor system, or was due to the crushing of some particularly weak bent in the trestle. The former seems the more probable, in view of the great surplus strength of the trestle bents, of the condition of those still standing, and of the fact that the whole lower tier of bents had just been overhauled and repaired. The derailed car was almost certainly the part of the train under which the break occurred.

The smoker, express car and baggage car went down first. The passenger coach fell over on them, and the first of the three sleepers was pulled over and stood on end, leaning against the end of the trestle work. The tender and locomotive were pulled back and fell over on top of the wreck. The coupling between the front sleeper and the second broke, and the two rear cars were left on the rails.

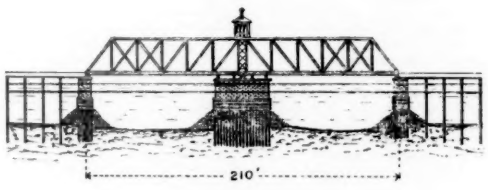
Of the passengers and officers on the train 8 were killed and 23 wounded, of whom one has since died. The company lose, beside the trestle, four cars, which are complete wrecks; the damage to the Pullman, which is about half its value; and the damage to locomotive and tender, which is not very great. Their traffic is taken on their old line, via Gordonsville.

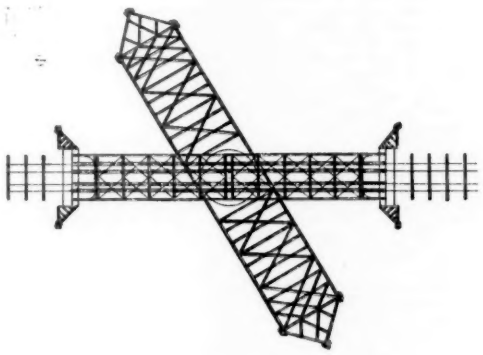
In view of these results, it does not seem necessary to preach a sermon on the saving efficacy of strong bridge floors,



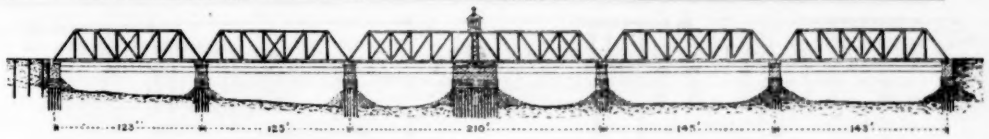


Old Jack Knife Draw—Plan and Elevation.

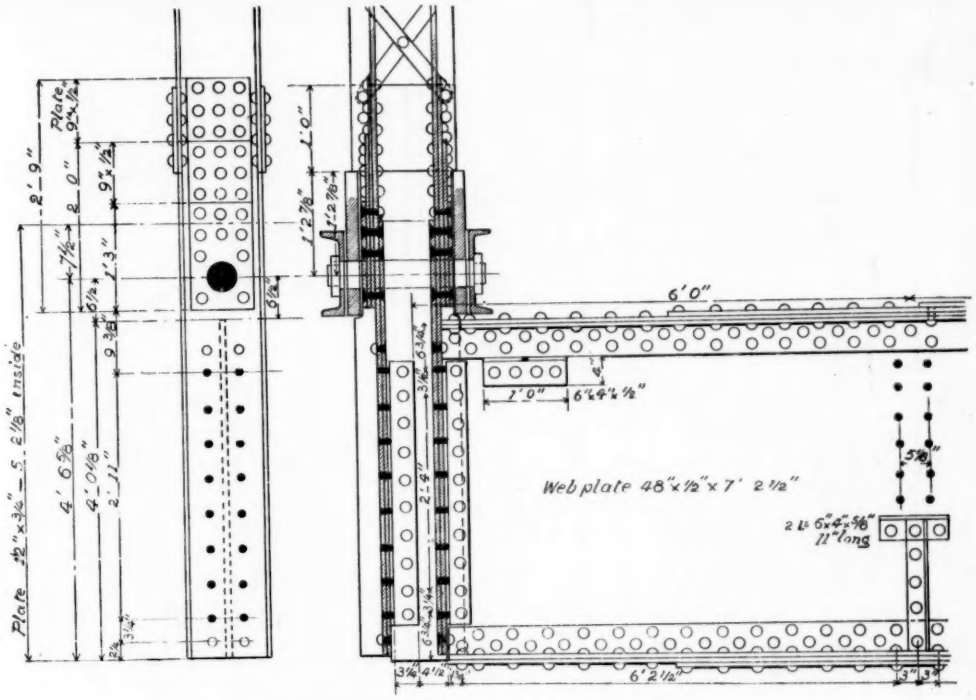




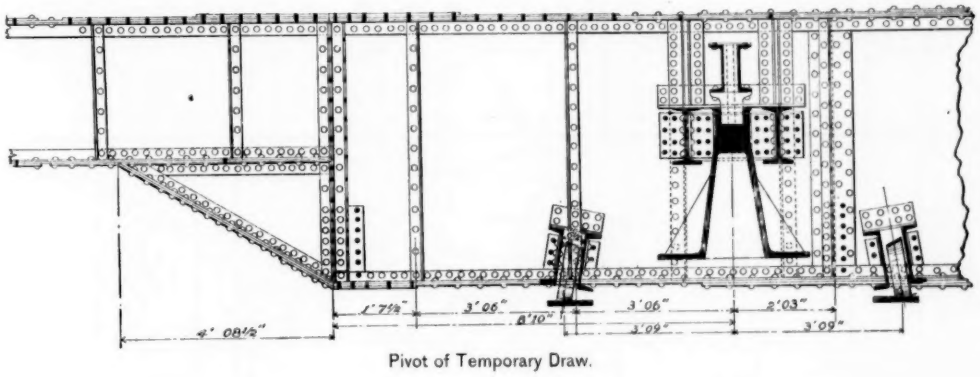
New Draw—Plan and Elevation.



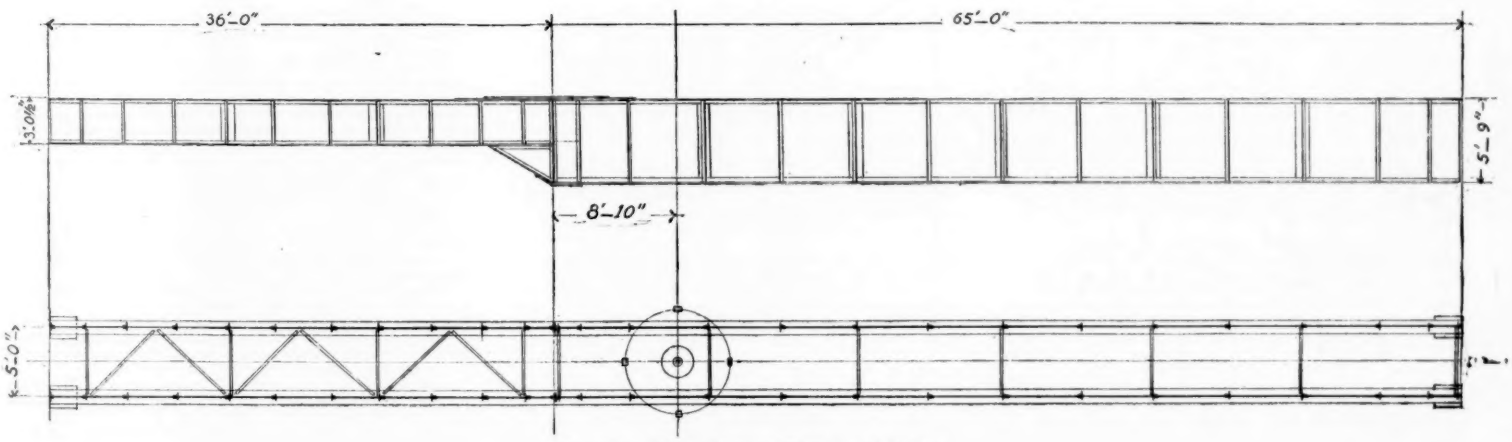
Permanen Bridge—Not Completed.



Permanent Structure—Detail of Floor Beam Connection.



Pivot of Temporary Draw.



Temporary Draw—Plan and Elevation of Girders.

HACKENSACK DRAW-BRIDGE, MAIN LINE OF ERIE RAILROAD.

inside and outside guards, and rerailing frogs. It should be said, to the credit of the Virginia Midland, that in the whole history of the road they never before lost a passenger.

WM. M. THORNTON,
Prof. Civil Engineering, University of Virginia.

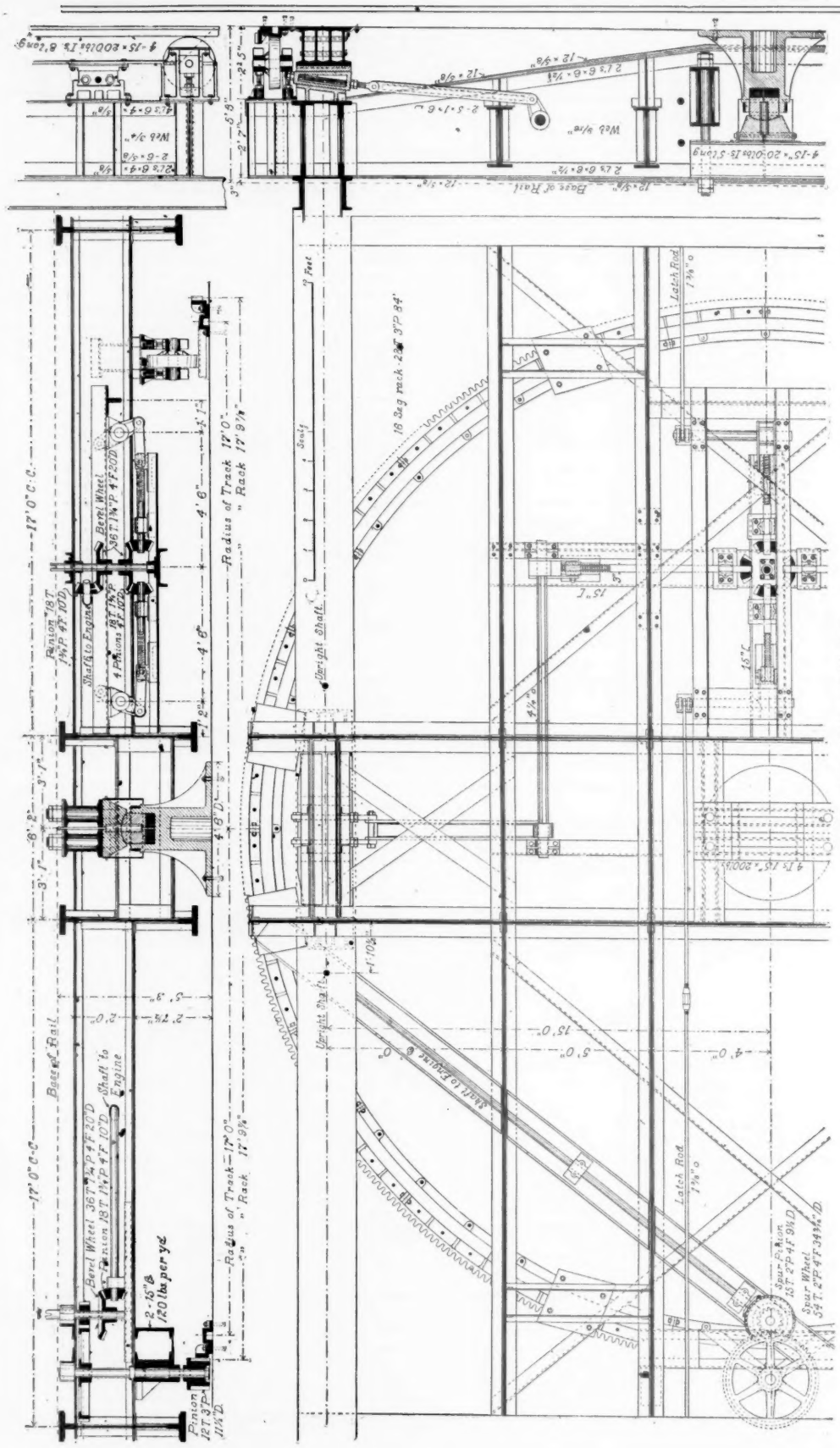
The Hackensack Draw-bridge of the Erie.

An interesting and unique specimen of a draw-bridge was recently removed on the main line of the New York, Lake Erie & Western Railroad where it crosses the Hackensack River, to make room for a structure better adapted to the requirements of the road and more in accordance with modern practice. The road crosses the river on a pile trestle about 1,400 ft. long, the draw-bridge being located near the western shore. The old draw was composed of two Howe truss spans, 71 and 74 ft. long respectively, and the tracks were spaced 16 ft., centre to centre. The two spans were operated independently of each other and turned in opposite directions, one opening up stream and the other down, on the jack knife principle. The free end of each span was supported by chains from a gallows frame. The small depth of the trusses, owing to the nearness of the rails to the water, made it necessary to reinforce them in order to carry the heavy traffic. This was done by placing a transverse beam at each end of the top chords, the ends of the beams projecting a short distance beyond the trusses. Diagonal rods led from the ends of these beams to two transverse beams placed under the bottom chords.

These bridges, being on a skew, gave a clear opening of only 40 ft. at the narrowest point. This, in connection with the fact that much valuable time was lost in turning the draw by hand and the prompt movement of trains, which on the Erie run at very short intervals, was thereby interfered with, led to the substitution of the draw which we herewith illustrate.

Realizing the constantly increasing importance of navigation on the river it was determined to build a draw-bridge with two openings sufficiently large to pass freely crafts of the largest description plying on this river. The new draw is of the centre bearing type, double track, with two Pratt trusses 30 ft. centre to centre, and 210 ft. long., centre to centre of end pins. The centre panel is 6 ft. 2 in., and at each side are six panels of 17 ft. each. The wedges, there are six, as well as the turning gear, are operated by a double cylinder engine with pistons 5 by 6 in., making 250 revolutions per minute. Steam is supplied by an 8 horse-power boiler. All the machinery is placed in a cabin on the top of the bridge at the centre.

The roller track is 34 ft. in diameter, and the rack is 35 ft. 7¾ in. Upon the end of the shaft operated by the engine is a pinion 10 in. in diameter, meshing with another 20 in., mounted upon a short vertical shaft placed near the outer edge of the drum and carrying a gear 9½ in. in diameter,


Radius of Track 12'0"
" Rack 12' 9⅛"
Bevel Wheel 36T. 14 P. 4 F. 20D
Pinion 18T. 14 P. 4 F. 10D
Shaft to Engine
Upright Shaft
Spur Pinion 15T. 2 P. 4 F. 9½D
Spur Wheel 54T. 2½ P. 4 F. 34⅝D
Pinion 12T. 3 P. 11½ D
Latch Rod
Details of Turntable and Wedges.

HACKENSACK DRAWBRIDGE, MAIN LINE OF THE ERIE RAILROAD.

working with one 34⅞ in. upon a second vertical shaft whose lower end is provided with an 11½-in. pinion meshing with the rack. This system of gearing permits the engine to be run at high speed. The bridge is provided with automatic latching and signaling attachments, and switch rails are used at the ends so as to avoid the unpleasant hammering occasioned by stub-rail joints.

During erection, traffic was carried on a side track having a temporary draw and laid with double rails, gauntlet. The centre of the temporary draw was 60 ft. from the centre of the permanent trestle. This arrangement of the permanent and temporary tracks prevented the erection of the new draw in the usual way upon the centre pier and fender, and it was therefore erected in line with the trestle, during the winter.

The construction of the temporary draw was most peculiar and never since it may be said to have been composed solely stock material, as each of its parts was originally designed for other duty. The scheme finally adopted by Mr. Bachholz for a temporary draw, as being the cheapest and most efficient, was to utilize two spans of plate girders which were being built for the company, and which were not required for immediate use. One of these girders was 65 ft. long and 5¾ ft. deep. The other was 36 ft. long, 3 ft. deep, and was attached by bolted angles to the end of the other after the manner of a bracket. The latter served simply as a counterbalance. These girders were securely spliced together, placed 5 ft. centre to centre. The pivot consisted of an ordinary turntable centre, the bridge being prevented from tipping while turning by four trailing wheels fastened on suitable brackets. The centre of this span was placed so as to give a river arm of 56 ft. At the ends the draw was supported by wedges. The turning of the draw was done by means of a rope secured to the ends, and wound on a windlass stationed on the east abutment.

The water at this point of the river is about 25 ft. deep. For the foundation of the pivot pier 200 piles were driven through the mud to hard pan, which was struck about 60 ft. below the surface. After having been thoroughly rip-rapped, the piles were cut off about 10 ft. above the mud. On these piles a solid rib 41 ft. square and 8 ft. thick was sunk, and on the crib was built a masonry pier 13 ft. high and 38 ft. in diameter. The foundations for the abutments, which are 40 by 11 ft., are of similar construction.

The centre pier fender is built of piles thoroughly braced, and is 41 ft. wide and 219 ft. long, with triangular ends. It rests at an angle of 61 deg. with the track, the peculiar course of the currents causing the channel to cross the line at that angle. At the present time a trestle forms each approach to the bridge, but it is the ultimate intention of the company to build at one side of the draw two permanent spans of 145 and 143 ft. each, and at the other side two spans of 125 and 123 ft. each. The remainder of the trestle will then be filled in.

The iron work for both the temporary and permanent draws was furnished by the Passaic Rolling Mill Co. The contract for the temporary track and pile foundations was awarded to D. S. Cofrode, and that for the masonry to Nolan Bros., of Reading.

The entire structure was built under the direction of Chas. W. Buchholz, Chief Engineer.

Train Accidents in June.

COLLISIONS.

REAR.

1st, on Battimore & Ohio, near Bellaire, O., freight train broke in two and rear section ran into forward one, wrecking 15 cars.

3d, on California Southern, at Los Angeles, Cal., a passenger train ran into some freight cars standing on the main track, doing some damage. It is stated that the passenger train was 7 minutes ahead of time.

5th, on Pennsylvania, near Brinton, Pa., freight train ran into a preceding freight, damaging engine and several cars.

5th, on Pennsylvania, near Irwin, Pa., freight train ran into a preceding freight, damaging several cars.

8th, on Southern Pacific, at Belmont, Cal., passenger train ran into some cars which had been left standing on the main track by a switching freight, damaging the engine and 3 freight cars.

11th, on New York, Lake Erie & Western, at Griswold's, N. Y., freight train ran into a preceding freight, wrecking caboose and 5 cars, and throwing engine and tender over an embankment.

11th, night, on Alabama Great Southern, near Tuscaloosa, Ala., an empty engine ran into the rear of a freight train on a sharp curve, doing considerable damage; fireman fatally injured by jumping.

11th, on New York Central & Hudson River, in Rochester, N. Y., an east-bound freight train ran into some stationary cars in the yard, derailing two of them.

13th, on Louisville & Nashville, near Georgiana, Ala., freight train ran into a preceding freight, wrecking engine, caboose and 4 cars.

13th, on Milwaukee, Lake Shore & Western, as a freight car was being switched at Appleton Junction, Wis., the brake rigging gave way and it ran down grade two miles, to Appleton, where it was turned on to a sidetrack and ran into some standing freight cars, doing considerable damage.

14th, on Lake Shore & Michigan Southern, at Adrian, Mich., the forward portion of a freight train which had broken in two, in attempting to avoid collision with the detached section, ran into the rear of another freight train standing in the yards, and the engine and 18 cars were demolished, the rear section coming on and adding to the wreck.

14th, on New York, Lake Erie & Western, near Kirkwood, N. Y., freight train broke in two and the rear section ran into the forward one, wrecking 2 cars.

15th, on Pittsburgh & Lake Erie, at Chartiers, Pa., passenger train ran over a misplaced switch and into a freight car standing on a side track, wrecking engine, baggage car and one coach, and injuring 2 trainmen.

15th, night, on New York, Lake Erie & Western, near Hoboken, N. J., freight train ran into a preceding freight, damaging engine, caboose and several cars.

15th, on Pennsylvania, in Philadelphia, Pa., a long string of freight cars got away from the trainmen and ran some distance down grade into another train of cars standing in the yards. The runaway cars had attained considerable speed, and the force of the collision demolished several of them containing oil and other combustible material. The wreck caught fire and about a dozen cars and an overhead bridge were burned up.

15th, on Pennsylvania, in Philadelphia, Pa., a passenger train ran into the rear of a freight train, damaging engine, caboose and 1 car.

15th, on Denver & Rio Grande, at El Moro, Col., engine pulling a caboose was abandoned by both the engineer and fireman, 4 miles from El Moro, on account of some disarrangement and because the air brakes would not work, and ran into the rear of a freight train standing on the main track.

16th, on New York, Lake Erie & Western, near Newburgh, N. Y., an empty passenger train ran into the rear of a coal train, damaging engine, caboose and 3 cars, and injuring a trainman.

16th, on Atchison, Topeka & Santa Fe, at Florence, Kan., freight train ran into a preceding freight, damaging engine and caboose and derailing several cars. Engineer injured by jumping.

19th, on Puget Sound Shore Railroad, at Franklin, W. T., a car of a switching freight collided with the rear end of a passenger train, killing one passenger.

19th, on Northern Pacific, near Rathdrum, Idaho, freight train broke in two and the rear section ran into the forward one, wrecking a number of cars.

20th, on Delaware & Hudson Canal Co.'s road, at Waterford, N. Y., freight train ran into a preceding freight, damaging engine and several cars.

20th, on New York, New Haven & Hartford, at Stamford, Conn., freight train ran into an empty passenger train standing on a side track, damaging engine and several cars.

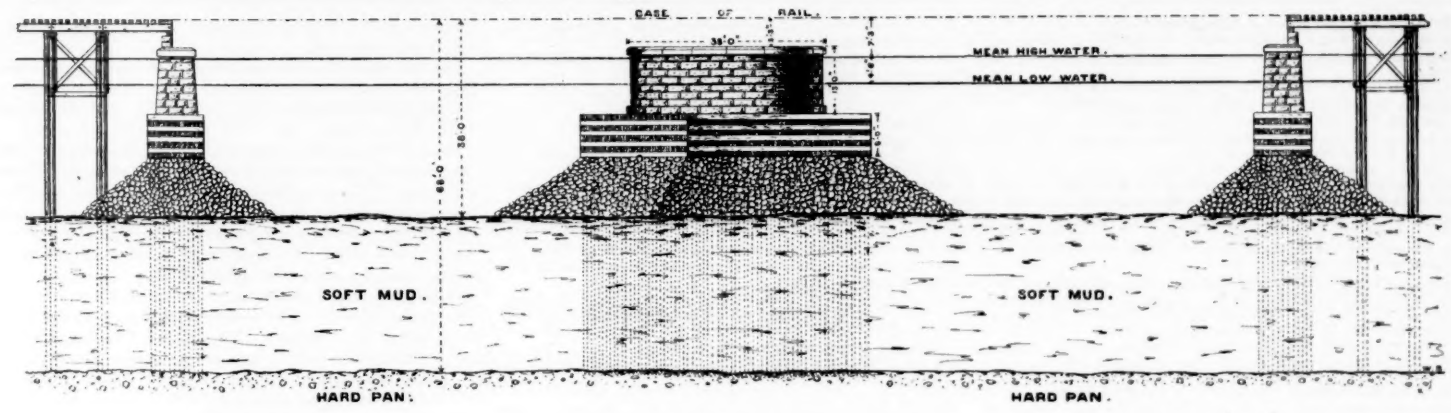
21st, on New York Central & Hudson River, at Amsterdam, N. Y., a west-bound freight train, consisting of 46 cars, of which the 21 foremost ones were empty, broke in two between the thirteenth and fourteenth cars. The first 16 cars had the automatic air brake, and the forward portion of the train was, therefore, stopped very suddenly; not, however, until it had run forward so as to leave a considerable space between the two portions. The rear portion ran into the forward part with great force, wrecking 7 cars and piling them up so as to obstruct all four main tracks for two hours.

21st, on Pennsylvania, at Columbia, Pa., freight train ran into a preceding freight, wrecking an engine and several cars. The wreck caught fire and was partially consumed.

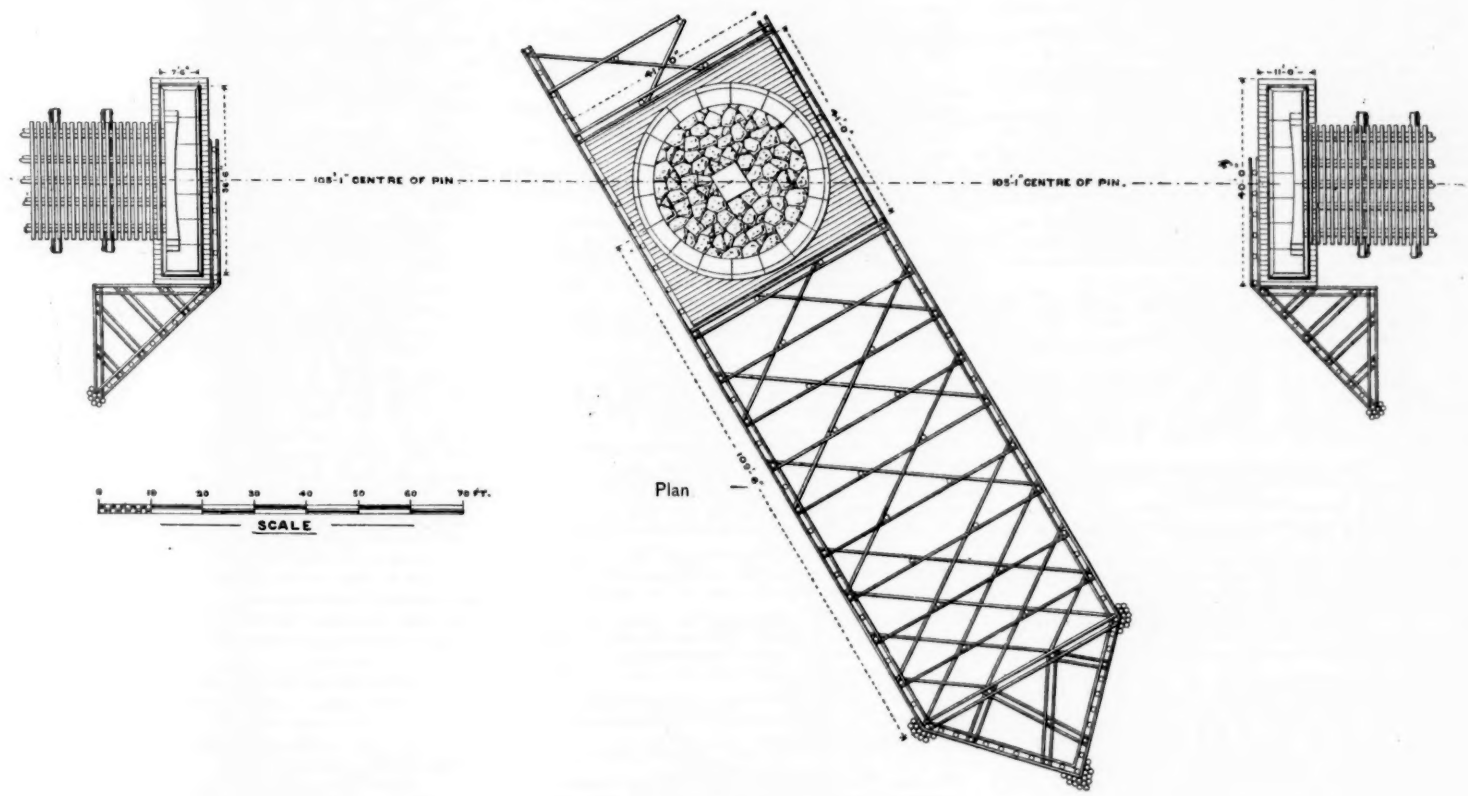
23d, on New York, Lake Erie & Western, at Whitehouse, N. Y., passenger train ran over a misplaced switch and into a freight train on side track, throwing the passenger train into the ditch; engineer killed, fireman and 1 passenger injured. It is supposed that the switch had been purposely misplaced.

23d, on New York, Lake Erie & Western, near Shohola, Pa., a freight train ran into a preceding freight, wrecking engine, caboose and 5 coal cars.

25th, on Louisville & Nashville, at Holmes' Gap, Ala., passenger train ran into the rear of a freight train, damaging engine and 4 freight cars and injuring the engineer.



Elevation



Plan

Foundations of Draw Span.

HACKENSACK DRAWBRIDGE, MAIN LINE OF THE ERIE RAILROAD.

25th, on Delaware & Hudson Canal Co.'s road, near Albany, N. Y., passenger train ran over a misplaced switch and into a car loaded with lumber, doing some damage.

26th, on Atchison, Topeka & Santa Fe, at Kinsley, Kan., passenger train ran into a preceding passenger train, damaging engine and 2 cars and injuring a trainman.

26th, on Chicago & Northwestern, at Marquette, Mich., a freight train struck the tender of an engine of a switching freight projecting over the main track from a siding, doing considerable damage. Engineer seriously injured.

26th, on Pennsylvania, at Cable City, Pa., a gravel train ran into a switching freight train, wrecking engine and several cars; 6 laborers were killed and 4 injured.

27th, on Boston & Maine, at Woburn, Mass., passenger train ran over a misplaced switch and into a freight train standing on a side track, wrecking several cars. Two men in the freight cars and 2 passengers were injured.

BUTTING.

2d, on Union Pacific, near Rogers, Neb., a butting collision between two freight trains disabled both engines and derailed and damaged 3 cars.

4th, on New York, Lake Erie & Western, in Elmira, N. Y., butting collision between two engines.

4th, very early, on New York, New Haven & Hartford, at Leonard's Bridge, Conn., butting collision between two freight trains, due to a dispatcher's mistake, doing considerable damage and killing a conductor.

4th, on Southern Pacific, in El Paso, Tex., butting collision between two freight trains, disabling both engines and damaging several cars.

4th, on Pennsylvania, at Kennedy's, Pa., butting collision between two freights, wrecking both engines and several cars.

6th, on Delaware & Hudson Canal Co.'s road, at Summit, N. Y., butting collision between two freight trains, doing considerable damage.

7th, on New York, Lake Erie & Western, near Hancock, N. Y., butting collision between two freight trains just as one of them was passing off the bridge over the Delaware River; several cars were derailed and thrown against the truss, which gave way and went down into the stream below.

8th, on Chicago & West Michigan, near Muskegon, Mich., butting collision between two freight trains, doing considerable damage.

9th, on Philadelphia & Reading, near Shamokin, Pa., a butting collision between two freight trains piled up both engines and a portion of each train in a bad wreck; 4 trainmen injured, one of them fatally.

11th, in the yard at Armstrong, Kan., butting collision between an empty Union Pacific passenger train and a Chicago, Kansas & Nebraska freight train, wrecking both engines and damaging several cars in each train.

11th, on Union Pacific, at Salt Lake City, Utah, butting collision between two switching freight trains, doing some damage.

12th, on New York Central & Hudson River, at Lyons, N. Y., butting collision between a coal train and a switching freight train, damaging the engines and several cars.

16th, on Richmond, Fredericksburg & Potomac, at Laurel Station, Va., butting collision between a passenger train and a freight train, damaged both engines and several freight cars, injuring 3 trainmen.

19th, on Baltimore & Ohio, near Black Hand, O., butting collision between a passenger train and a freight train, doing some damage.

20th, on Chicago & Indiana Coal Co.'s road, near Rosedale, Ind., butting collision between a passenger train and a freight train on a curve, damaging both engines and several cars. Engineer injured by jumping.

21st, on Long Island, in Brooklyn, N. Y., passenger train ran over a misplaced switch and into the head of another passenger train on the opposite main track, damaging both engines.

22d, on New York, Pennsylvania & Ohio, near Miller's Station, Pa., butting collision between a passenger train and a construction train moving backwards, damaging engine and a wrecking 7 flat cars; 1 trainman and 1 passenger injured.

22d, on Pennsylvania, at Schuylkill Haven, Pa., butting collision between a coal train and a standing freight train, piling up both engines and a portion of each train in a very bad wreck, killing the engineer of the latter and a man riding on the engine and severely injuring the fireman.

24th, on St. Louis Bridge & Tunnel road, at St. Louis, Mo., butting collision between a bridge and a Wabash engine, damaging both, and injuring a fireman.

26th, early, on Baltimore & Ohio, near Chicago Junction, O., butting collision between a passenger train and a freight train, badly wrecking both engines and several cars in each train; engineer fatally hurt and several passengers injured.

27th, on Brunswick & Western, near Albany, Ga., butting collision between a passenger train and a freight train.

28th, on Atlanta & Florida, near Mt. Zion, Ga., a carload of steel rails ran out of a siding on to the main track and into the front of an engine. A man and a boy standing near the track were slightly injured.

30th, on Louisville & Nashville, at Bank Lick, Ky., butting collision between two freight trains, wrecking the engines and several cars, injuring a brakeman.

CROSSING AND MISCELLANEOUS.

1st, night, in Kansas City, Mo., a Missouri Pacific engine ran into a Kansas City, Fort Scott & Gulf switching freight, wrecking several cars.

1st, in Chicago, Ill., an Illinois Central engine ran into a Pittsburgh, Fort Wayne & Chicago passenger train at the crossing of the two roads. Both trains were badly damaged, the engine of the former being overturned.

3d, on New York, Lake Erie & Western, at Jefferson Junction, Pa., a passenger train ran into a coal train crossing the main track, damaging engine and 1 car.

5th, on Pennsylvania, at Corry, Pa., a west-bound freight train going on to a side track was run into by an east-bound freight train, wrecking 20 cars.

15th, on Chicago, Burlington & Quincy, at Buda, Ill, a passenger train ran into a freight train standing across the main track, damaging engine, baggage and several freight cars, and injuring a trainman.

15th, at the crossing in Jacksonville, Ill., a Chicago & Alton freight train ran into a Jacksonville & Southeastern switching freight, damaging engine and 3 cars.

22d, at Lebanon, Pa., a switching freight train backed into the rear end of a standing Cornwall passenger train and pushed the engine through the switch just as a Philadelphia & Reading passenger train came along, damaging both locomotives.

29th, night, at Newcastle, Ind., an Indianapolis & St. Louis passenger train ran into a freight train on the Louisville, New Albany & Chicago tracks, at the crossing of the two roads.

DERAILMENTS.

DEFECTS OF ROAD.

3d, on St. Paul, Minneapolis & Manitoba, near Anoka, Minn., construction train was thrown from the track by the spreading of the rails at a point where track repairs were in progress, killing a laborer and injuring 6 others.

9th, on Atchison, Topeka & Santa Fe, near Watrous, N. M., engine and several cars of a freight were derailed by a defective joint; engineer injured.

10th, on Philadelphia, Wilmington & Baltimore, in Philadelphia, Pa., 3 cars of a freight train derailed by a defective switch and damaged.

16th, on Chicago, Burlington & Quincy, at Riverside, Ill., freight train derailed by a defective switch, killing 2 tramps.

16th, on Newport News & Mississippi Valley, at Rockport, Ky., a freight train broke through a bridge; 1 trainman killed and 6 trainmen and 3 other employés seriously injured.

21st, on Louisville & Nashville, at Bozeman Station, Ala., engine of freight train derailed by a defective switch.

21st, on Wisconsin Central, near Glidden, Wis., passenger train thrown from the track by a broken rail and ditched, injuring 1 trainman and 2 passengers.

21st, on Missouri Pacific, near Huron, Kan., passenger train was thrown from the track by the spreading of the rails, and several cars went over an embankment, injuring 3 passengers.

22d, on Southern Pacific, near Delano, Cal., several cars of a freight train were derailed at a point where track repairs were in progress.

26th, on Texas Trunk, near Kleburg, Tex., passenger train was thrown from the track by the spreading of the rails, the baggage car and one coach going over an embankment; 1 trainman killed, 4 passengers seriously injured.

27th, on Savannah, Florida & Western, near Thomasville, Ga., a trestle gave way under a freight train, caboose and three cars going down with it; 2 trainmen injured.

27th, on Louisville & Nashville, near Tensas, Ala., passenger train went through a bridge which had been impaired by heavy rains, and was badly wrecked; killing engineer, fireman and 2 tramps, and injuring 2 trainmen and 4 passengers.

DEFECTS OF EQUIPMENT.

1st, on Philadelphia & Reading, near Shamokin, Pa., freight train derailed and wrecked by a broken axle; 1 trainman killed and another severely injured.

3d, on Macon & Augusta, near Warrentown, Ga., several cars of a mixed train derailed by a broken truck.

5th, on Louisville & Nashville, near Covington, Ky., car in a passenger train derailed by a broken axle.

5th, on Syracuse, Geneva & Corning, near Dresden, N. Y., 16 cars of a freight train were derailed and wrecked by the breaking of a wheel.

18th, on Pittsburgh & Western, near Foxburg, Pa., freight train descending a steep grade broke in two near the rear end. The forward portion attained an uncontrollable speed and rushed down the track to a curve, where it was tipped over an embankment and wrecked. There was an engine attached to the rear portion, which had assisted in steadying the train down grade. Engineer fatally injured.

19th, on New York, New Haven & Hartford, in West Haven, Conn., car in freight train thrown across the track by the breaking of an axle, causing the ten following cars to be piled up in a bad wreck.

26th, on New York Central & Hudson River, near Bergen, N. Y., nine cars of a freight train derailed and wrecked by the breaking of a wheel.

26th, on Louisville, New Albany & Chicago, near Monon, Ind., engine of passenger train derailed by a broken wheel.

29th, on Lake Shore & Michigan Southern, at Dunkirk, N. Y., 5 cars of a freight train were derailed by the dropping of a brake-beam.

30th, on Wabash, near Worden, Ill., 16 cars of a freight train were derailed and badly wrecked by the breaking of an axle.

30th, on Union Pacific, near Valparaiso, Ind., car in a freight train derailed by the dropping of a draw-bar.

NEGLIGENCE IN OPERATING.

3d, on Denver, Utah & Pacific, near Lyons, Col., passenger train derailed by a misplaced switch and one car ditched, injuring 8 passengers.

4th, on Chicago, Milwaukee & St. Paul, at Beloit, Wis., passenger train derailed by a misplaced switch.

5th, on Milwaukee, Lake Shore & Western, near Bryant, Wis., caboose and 2 cars of a freight train were derailed and wrecked, owing to logs rolling off one of the cars and striking a switch so as to misplace it; 2 passengers in the caboose injured.

13th, on Chicago, Milwaukee & St. Paul, in Chicago, Ill., passenger train derailed by a misplaced switch.

16th, night, on Kentucky Central, near Maysville, Ky., engine and 12 cars of a freight train derailed by a misplaced switch and badly wrecked, injuring 2 trainmen.

18th, on Chicago, Milwaukee & St. Paul, near Latham, Ill., freight train ran over a misplaced switch, wrecking engine and 6 cars.

29th, on Chicago Belt, in Chicago, Ill., engine and 13 cars of a freight train derailed by a misplaced switch.

UNFORESEEN OBSTRUCTIONS.

1st, on Chesapeake & Ohio, near Gateman, Tenn., passenger train derailed by a tree which had been blown down across the track; engine and several cars damaged, and engineer and fireman injured.

2d, on New York, New Haven & Hartford, at New Rochelle, N. Y., freight train derailed and several cars damaged by a misplaced switch which had been turned by laborers on a spree.

6th, on Texas & Pacific, at Petty, Tex., a freight train in backing through a cut ran over a cow, and the caboose and several cars were derailed and wrecked, injuring 2 trainmen.

7th, on Denver & Rio Grande Western, near Lehi, Utah, passenger train ran over a cow, derailing 1 car.

14th, on Lake Erie & Western, near Lima, O., a freight train ran over a drove of horses and the engine and 10 cars were derailed and piled up in a bad wreck; engineer and fireman seriously injured.

16th, night, on Cincinnati, Wabash & Michigan, at Anderson, Ind., a passenger train ran over a horse while moving rapidly and the engine and several cars were thrown from the track, the former going into the ditch. The runner went down with the engine and was badly injured.

20th, on Chicago & Grand Trunk, near Valparaiso, Ind., freight train ran over some horses. Engine and 10 cars derailed and wrecked, 1 trainman killed, 1 injured.

21st, on Central Pacific, at Alameda, Cal., passenger train derailed by a purposely misplaced switch.

21st, on Union Pacific, near Kansas City, Mo., freight train derailed at a point where sand had been washed down upon the track in a cut, wrecking engine and 4 cars, and injuring 4 trainmen.

23d, on Louisville, New Orleans & Texas Pacific, near Fort Gibson, Miss., construction train ran over a cow and 25 cars were derailed and wrecked.

27th, on St. Louis, Iron Mountain & Southern, near Bald Knob, Ark., passenger train ran into a tree which had been blown down across the track, damaging the engine.

UNEXPLAINED.

1st, on Southern Pacific, near Tucson, Ariz., caboose and 2 cars of a freight train derailed and wrecked.

1st, on Northeastern, near Athens, Ga., engine of passenger train derailed.

1st, on Louisville & Nashville, in Birmingham, Ala., switching freight derailed and several cars badly wrecked.

1st, on Burlington & Missouri River, in the yard at Lincoln, Neb., engine derailed and overturned.

1st, on Brunswick & Western, near Albany, Ga., 5 cars of a freight train derailed and wrecked.

2d, on New Orleans & Northeastern, near Ellisville, Miss., freight train derailed and wrecked.

2d, on Annapolis & Baltimore Short Line, near Marley's, Md., 3 cars of a passenger train derailed and thrown over an embankment, injuring 1 trainman and 6 passengers.

2d, on West Virginia Central & Pittsburgh, in Cumberland, Md., 2 cars of a switching train derailed on a bridge and thrown into the canal.

3d, on New York & New England, at East Longmeadow, Mass., 2 cars of a circus train were derailed at or near a switch and thrown down an embankment, injuring 4 circus men.

4th, on Gulf, Colorado & Santa Fe, near Farmersville, Tex., 4 cars of a freight train derailed and wrecked.

5th, on New York, Pennsylvania & Ohio, near Niles, O., engine of construction train was derailed and wrecked, killing the engineer.

6th, on Pittsburgh, Fort Wayne & Chicago, near Louisville, O., 5 cars of a freight train were derailed and wrecked

7th, on New York, New Haven & Hartford, in Hartford, Ct., 2 cars of a freight train were derailed.

8th, on New York, Lake Erie & Western, near Alden, N. Y., engine and 12 cars of a freight train derailed and wrecked.

10th, on Denver & Rio Grande, near Palmer, Col., 7 cars of a freight train were derailed and wrecked.

11th, on Missouri Pacific, near Hillsboro, Tex., freight train derailed and 6 cars wrecked.

12th, on Lehigh Valley, at Fullerton, Pa., a truck under a car in a freight train was derailed and thrown in the ditch. The car, however, was held up by the link coupling and ran along for several miles.

13th, on New York, Lake Erie & Western, at Melrose, Pa., 12 cars of a freight train derailed and ditched.

13th, on Geneva, Ithaca & Sayre, near Ithaca, N. Y., freight train derailed and wrecked.

14th, on Atchison, Topeka & Santa Fe, near Braddock, Kan., passenger train derailed and several cars ditched; 15 passengers injured.

15th, on Pittsburgh, Fort Wayne & Chicago, near Massillon, O., several cars of a freight train derailed.

15th, on Wisconsin Central, at Westboro, Wis., rear car of a passenger train derailed at a switch.

16th, on New York Central & Hudson River, at East Buffalo, N. Y., engine and several cars of a freight train derailed and ditched; engineer fatally injured.

19th, on Monrovia Rapid Transit, at Ramona, Cal., engine of construction train derailed.

19th, on Housatonic, at Hawleyville, Ct., as a passenger train was backing on to the main track from a siding a combination car jumped the track and went down an embankment, killing the baggageman.

19th, on Housatonic, near Great Barrington, Mass., car of freight train derailed and thrown down an embankment, injuring 3 trainmen.

19th, on Virginia Midland, at Pope's Head Run, Va., engine and 3 cars of a passenger train derailed and badly wrecked, the former being overturned in the ditch; 3 trainmen and a man riding on the engine were killed, and 1 trainman and 4 passengers injured.

20th, on Southern Pacific, near Tehachipi Summit, Cal., rear car of a passenger train derailed.

20th, on Boston & Lowell, in East Cambridge, Mass., car in a freight train derailed, tearing up the roadbed and damaging an adjacent building. A rail was forced through the window of another adjacent structure, injuring an occupant.

20th, on Missouri Pacific, near Temple, Tex., caboose of a freight train derailed. A man in charge of a car-load of horses jumped from the rear end of the caboose and was killed.

21st, on Pittsburgh, Cincinnati & St. Louis, at Wheeling, W. Va., freight train derailed and thrown over an embankment into a river; engineer and fireman injured.

25th, on Central Iowa, at Mason City, Ia., freight train derailed and 5 cars ditched.

26th, on Cincinnati, New Orleans & Texas Pacific, at Junction City, Ky., passenger train derailed, overturning the engine, tender and mail car.

28th, on Brunswick & Western, near Merritt's, Ga., several cars of a passenger train derailed.

30th, night, on Chesapeake & Ohio, near Williamsburg, Va., construction train derailed and several cars wrecked, killing a laborer.

OTHER ACCIDENTS.

22d, on Baltimore & Ohio, at Keyser, W. Va., engine exploded its boiler; 1 trainman killed and 2 fatally injured.

28th, on Rome, Watertown & Ogdensburg, near Newfane Station, N. Y., passenger train broke in two on a high bridge. A passenger going from one car to another fell into the creek and was killed.

29th, very early, on Cleveland, Lorain & Wheeling, near Flushing, O., as a freight train was passing through a tunnel the roof of the tunnel caved in, burying a portion of the train and doing considerable damage.

A summary will be found in another column.

Annual Meeting of the Association of Railway Telegraph Superintendents.

SECOND DAY.

The meeting was called to order at 10:30 a. m. July 12, by President Lang, who announced that the next regular business would be the Report of the Committee on the adoption of a substitute for the long dash now used as the character for the cipher.

Mr. SELDEN reported, on behalf of the committee, that they had conferred by letter. They had called upon representatives of all the telegraph companies, and presented symbols suggested by different parties. Every new character suggested, however, conflicted with something already in use. If the letters were made correctly by an operator no trouble would arise from the confliction of characters now used. A feeling existed among all people identified with telegraphy that we should make no change in the Morse alphabet. Upon motion of Mr. Bogart, the Committee was discharged.

A telegram was read from G. C. Green (Northern Pacific) calling attention to the fact that superintendents did not act promptly in reporting discharged men. A general discussion ensued, in which the practice of reporting the discharge of operators through the Secretary's office was commented upon by the different members present. It was maintained that this system was not a blacklisting scheme, as has been generally stated, but merely a system by which the records of applicants for positions would be determined without loss of time and voluminous correspondence. It was decided to make no change in the existing methods, but it was generally understood that superintendents would cooperate with the Secretary in promptly distributing information of this character.

The following officers were elected for the ensuing year: President, G. C. Kinsman, Decatur, Ill.; Vice-President, C. A. Darlton, Washington, D. C.; Secretary and Treasurer, P. W. Drew, Chicago, Ill.

Mr. LATTIG gave the experience of the Lehigh Valley with the train telegraph during the blizzard last March. It was their only reliance for telegraphic communication for three days. All the relief and supply trains were governed through the medium of the train telegraph, and its operators were on duty day and night. A serious accident occurred and there was no other means of communicating with the wreck. The wire was broken once on Monday at Bound Brook by other wires falling upon it. This system appears to work better in stormy than in dry weather. The use of it for commercial telegraphing was gradually increasing. None of the previously existing telegraph offices had been abandoned by reason of its introduction, because the growth of business on the road required constantly increasing facilities. A gravel train which was engaged in the construction of an additional main track had been equipped with the apparatus. One hundred men were employed on this train, and during the first week one hour and 40 minutes of time were saved by the train obtaining permission to remain on the main line. Working time for this train has been saved every week since it was provided with means of constant communication with the dispatcher's office. All of the wrecking trains have now been equipped with these instruments, so that, after being ordered out they are in communication with headquarters until the wreck is cleared away and the train returns.

Messrs. Lockard, Lennard and Darlton were appointed a committee of arrangements for the next meeting.

Mr. R. W. POPE was granted permission to address the meeting in order to call attention to a misunderstanding which appeared to exist in regard to the work of the Association. He alluded to the fact that the application of electricity to railroad work was continually increasing, and pointed out that it would be for the best interests of its members to give greater attention to these matters in order to make their meetings more profitable, and keep abreast of the improvements which were continually being brought out. His attention had been called to this subject by the appearance of an article in the *Railroad Gazette*, describing an incandescent plant which had been introduced in the railroad yard at Oakland, Cal., for lighting the signal lanterns by electricity, which had proved to be more economical for the purpose than oil. He stated that a similar plan was in contemplation by the Pennsylvania for the Jersey City yard.

A discussion followed upon this subject, which led to the adoption of the following resolution: *Resolved*, That the chair appoint a committee of five on electrical information, whose duty it shall be to disseminate matters brought to their attention by members of this Association.

The Chair appointed to serve on this committee Messrs. Lennard, Lattig, Bogart, Swift and Higgins.

The Chair appointed, by direction of the meeting, a committee to select subjects and writers to present them in papers to be read at the annual meetings, Messrs. Herr, Selden and Lang.

Mr. G. L. LANG presented the following paper on Electric Welding by Otis K. Stuart.

ELECTRIC WELDING.

The process of electric welding which was discovered by Prof. Thomson some eleven years ago, while lecturing at the Franklin Institute of Philadelphia, has been developed in the past two years to a far greater extent than is generally supposed. We started in with the welding together of small wires of iron and copper, and have been so successful in the development of apparatus, that we are now able to weld bars of a very large size and of almost any shape or metal.

The principles involved is that of forcing through a conductor an amount of current that the conductor will not carry without heating. Any conductors, when placed in abutment, have as their point of greatest resistance the point of abutment or contact, and consequently it is at this point that the heat is first generated; and as is well known, this heat increases the resistance of the conductors at that point so greatly that more heat is developed at a remarkably rapid rate.

A consideration of the above facts will prove at once one of the advantages of electric welding, as practiced by Prof. Thomson, namely, the localization of the heat to the points or point at which it is desired, thus saving an enormous amount of energy which is usually wasted in welding with the forge or flame. So absolutely is the heat localized, that pieces of iron 3 in. long and an inch in diameter, can be welded together and then held in the hands for some time without any danger of burning, the only heat which is felt at all being that which is conducted along the metal to the hands after the welding is completed.

A further consideration of these facts will also demonstrate that it is possible by the Thomson process to weld any metal, including even those which melt at a very low temperature, such as lead, zinc and tin, and those which melt at enormously high temperatures, as, for instance, iridium, platinum, etc. Of course, it goes without saying that we can weld any of the metals used in ordinary manufacture.

It is plain that if the heat is developed so rapidly, a very delicate means of controlling it must be provided, and we are glad to say that we have been able to provide arrangements for this purpose which are almost absolutely perfect—I am inclined to say absolutely perfect for the reason that the control of the current can be made entirely automatic.

We are able to take a bar of inch iron 4 in. in length, raise it to a dull red in 20 seconds and hold it there for an indefinite period; to increase the heat to a bright red in a very few seconds and hold it there, then to still further raise the temperature to a welding or vaporizing point in a remarkably short space of time; this indicates the delicacy of this apparatus, and I would add that no very great skill is required to operate the machine, a boy learning to weld iron and steel with great facility in a week or two. The time required to weld metals depends, of course, upon the power of the apparatus and the skill of the operator. We have made strong and practically perfect welds in half-inch

round wrought iron in six seconds; in inch round wrought iron in 45 seconds, and so on. Experiments have proved to us that the power required to weld is proportional, or very nearly so, to the area of cross-section of the pieces: this is true of nearly all the metals, though, of course, the relative resistance and welding temperature of the several metals may interfere with this ratio.

For welding small wires such as telegraph or telephone, and the smaller sizes of electric light and power lines, the power required is very small indeed, the momentum of heavy machinery being more than enough to effect the weld. In this connection I desire to say that we are now working to perfect an apparatus for welding telegraph, telephone and electric-light wire, and lines of pipe on the line. Our experiments in this direction have been successful, and we now think it possible to construct an apparatus which will be capable of being moved about by one or two men, which will make joints in wires correctly and durably, the energy used being supplied by storage battery or batteries, forming a part of the welding outfit. For repair work and in general construction it is our belief that this apparatus will be found very useful and effective; in fact, we hope to do away entirely with the ordinary solder and link joints used at present.

The policy of placing an apparatus on the market has been adopted for the reason that our patents cover not only the apparatus for electric welding, but the art or process as practiced by Prof. Thomson. It is hardly necessary to add that by the same process we can solder and braze, and anneal, and temper, and do other heating, local or otherwise, which cannot be done economically by present methods. All these operations can be performed with the same apparatus, though, of course, it is better to have machines especially constructed for particular work.

Mr. LANG stated that he had seen one of these machines in operation when a bar of cast steel and one of copper were welded together. One would suppose that the metal most easily fused would burn away before the other was brought to a welding heat. This is not the case, however, and it is very simply provided against. The current is brought to the bars through clamps which grasp the bars near to the ends to be welded. Where copper and steel are to be welded together, the clamp is placed about 6 in. back on the copper bar, while it is only about 1 in. from the point of contact on the steel bar. In this case the heat is diffused through a large body of the metal which is most fusible, so that they are both brought to a welding point at the same time. The process is something really wonderful, and promises to revolutionize the ordinary method. The system is now in constant use at the Thomson-Houston factory in Lynn, Mass.

By permission of the meeting, Mr. F. E. KINSMAN read a paper on an Electric Automatic Brake-controlling Device, which he claimed would make the existing air-brake and block signal system still more effective than they are now. The paper was referred to the Committee on Electrical information.

The meeting then went into executive session and subsequently adjourned to meet in Atlanta, Ga., Oct. 16, 1889.

THE EXHIBITS.

The Committee appointed at the meeting last year to secure and arrange exhibits of electrical appliances for railways did their work thoroughly, and all being shown in one room and the display was very interesting. The following is a list of the exhibits.

The Non-Magnetic Watch Company of America: Non-Magnetic Watches in great variety.

Giles Bros. & Co., Chicago: Large assortment of watches fitted with the Giles Anti-Magnetic shield.

The Western Electric Company, Chicago: Electrical instruments of all descriptions for railroad work, also a special self-starting register devised for use in dispatcher's office.

The E. S. Greeley & Co., New York: A fine display of key sounders, switches and measuring instruments, also a self-starting register.

Combined Electric and Trip Bell Cord Co.: A three-conductor bell cord for an electric train signal, which can also be used as a mechanical bell cord in the ordinary manner.

The Pennsylvania Steel Co.: Crossing, semaphore and automatic semaphore block signals, all designed to be operated by magneto-generator.

Consolidated Railway Telegraph Co., New York: Two stations equipped in working order with induction train-telegraph apparatus.

The Edison phonoplex was shown by working apparatus.

The Union Indurated Fibre Co., represented by Robert Coleman: Samples of hemispherical bottom fire buckets, pipe for conduits, battery boxes and other articles made of that material.

The Railway Cab Electric Signal Co.: A working model, with track and locomotives complete, showing the operation of the cab signal.

Charles McIntire & Co.: Samples of the McIntire connector, as applied to wires of all sizes.

Waters-Sweeney Telegraph & Telephone Switch Co.: Telegraph switch, specially devised for economy of battery material and office space.

Street's Railway Signal Co.: Highway crossing signal, illustrated in the *Railroad Gazette* of May 4 last.

The Union Switch & Signal Co.: A variety of electric signals for switches, crossings, blocks, etc., including the illuminated semaphore, illustrated in the *Railroad Gazette*, March 30 last. The semaphore on exhibition was provided with red and green glass disks fitted to roll by gravity to a position in front of the flame. When the arm is horizontal the red disk is in position, so that the oblong light is invariably red; when the arm is pulled down the disk rolls away leaving the light white. A modification is provided by which a green disk (for caution) rolls into position when the arm is dropped about 40 deg. from horizontal.

The members of the Association and their friends visited Manhattan Beach Thursday evening as guests of the Long Island Railroad Co. They were unfortunately delayed on their return trip by a mishap to another train, and did not reach New York until about 3 a. m. In consequence of this detention many of them did not feel equal to carrying out Friday's programme. A delegation went, however, to the West Shore station at Weehawken, whence they were escorted by Superintendent Bogart and Division Chief Operator W. W. Montalvo, to a special car, where they were taken in charge by Henry Harley, Superintendent of the American Railway Signal Co., whose signals are in use at both ends of the Weehawken tunnel. The peculiar feature of this system for providing against accidents arising from the parting of a train on a block, renders it of special interest as adding another safeguard to the automatic electric signal, and its operation was thoroughly explained. Transportation to Jersey City was provided over the Junction Railroad, and an elegant lunch was spread for the entertainment of the guests en route. From Jersey City the party went to Easton, Pa., by invitation of the Lehigh Valley, to inspect the train telegraph, which is familiar to the readers of the *Railroad Gazette*. The length of time this system has now been in use, and the experience with it during the blizzard, has greatly increased the estimation in which it is held by the Lehigh Valley management, and there is no doubt as to its practical utility, not only for the convenience of travelers, but for constant use in the working of the road. Although the perfect reading of the signals is somewhat difficult at the outset to an operator not familiar with the sound, those who have had very little experience with the instruments have no trouble in copying long communications as readily as with the ordinary Morse apparatus.

Some Observations on the Elasticity of Car Wheels, Rails and Road-bed.

A few observations of a preliminary character were recently made at the Allston shops of the Boston & Albany Railroad and in that vicinity upon the elasticity of certain railroad material. They consisted of measurements of the compressibility under load, or the restoration when the load was released, of some cast-iron wheels in the truck of a box car, the weight of which was 24,930 lbs. and the load in that end of the car experimented upon was 26,000 lbs.

The wheels were 33 in. diameter, and were of different patterns as regards the form of web, one having a much more curved shape than the other. Their weights were about 550 lbs. each.

The first wheel, having the greater curvature of web, had a distance of 15 in. laid off on the inside, one extremity of the length was on the flange and the other extremity was on the hub near the axle. This gauged length was defined by centre-punch marks. A special form of micrometer, designed by the writer, was used to indicate the change in the gauged length, resulting from the change in load which takes place as the wheel turns. The gauged length was first observed when the points were in a vertical plane and below the axle, and again when the wheel had made one-quarter of a turn. The movement appeared to be 0.008 of an inch. Again, measuring on a shorter length, 10 in., on the outside of the same wheel, one extremity being just inside the chill, the other extremity on the curved web, the movement here was found to be 0.0022 of an inch. A corresponding measurement taken on the outside of the second wheel gave a movement of 0.0009 of an inch.

These measurements are regarded as approximate; the difficulty of securing good centre-punch marks on so hard metal was an obstacle at the time. It will be noted, however, that the measurements showed greater rigidity in the second wheel than in the first, thus confirming what was expected on account of the difference in shape of the webs. That fact increased our confidence in the measurements, and while they were regarded as approximate, yet they are thought to have been close approximations. In a more thorough examination of the elasticity of wheels it will, of course, be desirable to follow the movements through a full turn. The elastic movement of the metal is small, as the results show, yet it is measureable, and no doubt an examination of other types of wheels would show greater differences in the amount of elasticity displayed in extreme cases. To what extent the elastic properties of the metal should be made use of need not be discussed at this time.

Concerning rails, measurements were taken on the upper surface of the base of an old steel rail which was branded "Blanavon 1869," and measured about 3⅝ inches high, estimated weight 60 lbs. per yard. The rail was loaded between ties which were 24 in. apart on centres, with one of the driving wheels of a four-wheeled switching engine weighing 22 tons.

The extension of the metal in the base measured over a distance of 6 in., showed the stress to have been not far from 14,000 lbs. per square inch. The facility with which measurements of this class may be taken suggests a large number of other observations which might be undertaken with advantage, and which promise data for the solution of many important questions.

The elasticity of the road-bed was shown by means of an astronomical spirit-level which was mounted on a beam 34 in. in length and which was placed for the time on the ballast of one track, between the rails and between the ties, the level being supported on blocks under the ends of the beam. Observations were made while a train occupied the adjacent track. The movement of the level-bubble showed that on a gravel embankment the weight of a locomotive and train appreciably affects the general level of the surface of the road-bed immediately under and also to some distance on either side of the train. The first observation was made opposite a station while a train approached, made a stop and departed. From a position opposite the tender, the level indicated a slope of the surface of the ballast of about 0.001 of an inch in a distance of 30 in. This was diminished to about one-half the amount when the train had moved so that the passenger coaches and not the tender were opposite the spirit-level. When the train had entirely left the station, the level-bubble returned to its former position, thus indicating perfect elasticity of the road-bed, at least within the limits of observation.

Another trial was made with the level, placing it close to the track while the switching engine, previously referred to, was run alongside the instrument. Upon this occasion the observations were made on the filling between the Allston shops and the nearest track. With the level so near the track the depression due to the weight of the engine caused the bubble to pass beyond the graduated part of the tube, and the amount of depression was not ascertained. It was evident from this experience that movements of depression may be expected so large as to require the employment, at times, of an auxiliary micrometer screw to obtain the measurements. The fact will be noted that although the weight of the brick walls of the shops must have given considerable initial compression to the ground in that vicinity, yet that did not prevent the additional weight of the engine from causing a still further depression of the surface.

To what extent initial compression may affect the elasticity of the ground is reserved for future experiment, when observations will be made in the vicinity of heavy buildings and at other places where the character of the subsoil and filling are alike so far as may be known. Within the elastic limit the compressibility of iron and steel is not affected by initial loads, that is, each increment of load produces its proportionate compression. It is not established, however, that such is strictly the case in the compression and elasticity of earth-work. The geological character of the locality would, no doubt, have an influence upon the extent to which the surface of the ground is depressed by a given weight, and also in limiting the distance from the load beyond which the amount of depression becomes inappreciable. It seems feasible to ascertain the relative rigidity of the track at different parts of the line, between its condition in the summer months and in the winter by means of similar observations, separating the several elements which have an influence on rigidity, and observing to what extent each contributes its share.

The writer desires to acknowledge his indebtedness to Mr. J. M. Ford, of the Boston & Albany, and to Mr. P. H. Dudley for their assistance in making these trials.

JAMES E. HOWARD.

TECHNICAL.

Dissolution of the Partnership of Saxby & Farmer.

It is announced that this celebrated firm, which has long been engaged in the manufacture of signals, inter-locking apparatus, etc., in England and France, has been dissolved. Mr. Saxby takes all of the property and business in France, and will continue the works at Creil as heretofore.

The New Shops of the Fitchburg.

Ground has been broken at East Fitchburg for the new and extensive car shops of the Fitchburg Railroad Co. There are to be six buildings in all. Four of them will be placed side by side and will each be 100 ft. wide by 480 ft. long, covering about 1⅛ acres, and divided by two cross walls into three equal sections of 160 ft. each. The first shop will be for car repairs, the next for building freight cars, the third for passenger coaches and the fourth for a paint shop. Large transfer tables will be put in and some 15 or 20 tracks will be laid in each shop longitudinally, and by means of the transfer tables a car can be run in or out of either of the shops without interfering with any other car. Across the spur track will be two other buildings, one 60 ft. by 300, for the wood working department, and the other 60 ft. by 400, will be the machine shop, engine and boiler house. All of the buildings will be of brick and, with one exception, one story in height, with a monitor roof; the wood working shop will be two stories high.

Interlocking on the Long Island Railroad.

The Long Island road has just finished a new 24-lever interlocking tower at Woodhaven Junction. The system used on this road was illustrated in the *Railroad Gazette*, Feb. 16, 1888. The apparatus is built in the company's shops. At the beginning of this year the company had in service 14 towers with 302 levers.

Draughting Instruments of Celluloid.

Messrs. Young & Sons, of Philadelphia, write to us concerning the use of celluloid for T-squares, etc., saying that they have been using it more or less for the last five years, but mostly for railroad curves. They have found, however, that the material is very liable to warp, and suggest that zylonite or ivoryine might give better results. The curves made by Messrs. Young & Sons are not transparent.

The "Monmouth."

A new steamer, the "Monmouth," has been placed on the Sandy Hook route, running in connection with the Central of New Jersey trains to Long Branch, etc. The "Monmouth" was built by Messrs Cramp, of Philadelphia, and has twin screws driven by triple expansion engines. She has three passenger decks and a dining and a wine room below the main deck. She is very conveniently and handsomely fitted up, and is finished in oak. The number of cabins or private parlors is considerable, and in addition a smoking compartment and numerous parlor car chairs are reserved for those who choose to pay an extra fare, or who have parlor car tickets. This feature does not meet with general approval.

The principal dimensions are as follows:

Length	270 ft.
Beam	48 "
Depth of hold	15 ft. 6 in.
Draft of water aft	10 ft.
" " forward	9 ft.
Indicated horse-power (max.)	2,800
Cylinders	10, 30 and 50
	30
Revolutions (max.)	150
" (actual)	120
Boiler pressure	160 lbs.
Propellers, diameter	9 ft.
" pitch	13 ft. 6 in.
Number of passengers (seated)	2,200

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions (machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Elsewhere in this issue will be found a special report on the most serious recent train accident. It is not necessary to point out the lessons of the accident. They are sufficiently obvious and have been reiterated in these columns at pretty short intervals for years. The wise regulation, which appears to have been in force, requiring the speed of trains to be reduced to six miles an hour in passing this trestle, is not mentioned in the report. But for that regulation the loss of life would, in all probability, have been much greater than it was.

The testimony of the Lehigh Valley officers concerning the utility of the train telegraph is of decided interest, and operating officers will take an interest in the practical figures given which they cannot feel in a drawing-room car luxury for impatient passengers who cannot wait till they reach a station to send their messages. One hundred minutes' time of 100 men at $1.25 per day means $20 in real money, and money-saving is unfortunately one of the burdens on the minds of railroad officers as well as of some other people.

We give this week the report of the closing session of the Railroad Telegraph Superintendents' Association held in New York City last week. This association has an important and broadening field before it, and it is gratifying to see that its members appreciate this fact and are disposed to improve their opportunities. The use of electricity is increasing on railroads, and it will undoubtedly fill an important place in the near future on many roads where it is now a mere adjunct or wholly neglected; and those telegraph superintendents who best keep themselves abreast of the times and show themselves qualified to take intelligent charge of electrical affairs will be most likely to advance their own interests and to benefit their employers as well. Telegraphers have a sort of prior lien on all matters electrical, and they have themselves to blame, generally speaking, if they do not enforce it.

The delivery of freight to the stores and factories of consignees, which is the common usage in Great Britain, is now practiced in this country, the roads centering in Atlanta, Ga., uniting in an agreement of the kind. One road controls tracks to a large number of establishments, and so, as regards the business to and from these places, has had the "inside track," literally. To get even with this favorably-situated road, the others had to resort to free wagon delivery. The road furthest from the centre of business began the practice and the others followed. We do not understand that the roads own outfits of wagons, horses, etc., or that they collect freight for outward shipment. We do not recall any other instance of this way of doing business in this country, but secret agreements to "absorb" cartage for favored customers, or to meet special competition, which have lately been very freely charged against the Trunk Lines, and which have for years been more or less resorted to by "sharp" traffic men, have their logical outcome in an arrangement of this kind. Irregularities arising from this source are generally soon settled, because the full adoption of a distinct additional branch would add burdensome complications to the business of transportation; but soliciting agents who desire to do business by above-board methods would certainly be relieved of one embarrassment if store-to-store rates were universal.

After all, the New South Wales Government has given the contracts for locomotives to colonial builders, and both *Engineering* and *The Engineer*, in recent issues, have a good deal that is unpleasant to say about the high-handed means adopted by a free trade government to protect the "infant industries" of the colony. It appears that tenders have been accepted from two colonial builders for 25 passenger engines at £2,989, and 25 freight engines at £3,000. English builders had bid £2,375 and £2,245 on the specifications and drawings first submitted for offers, or an average of £2,310, and the colonial government offered to place the contracts at home if the local builders would take them at £3,000. From such accounts as we have it appears that after bids had been sought abroad, the colonial government modified and simplified the designs and specifications "in order that every part of the work could be carried out in the colony." Then a fortnight was allowed for the preparation of new bids. Obviously this prevented any foreign builders from bidding unless they had competent agents on the spot. The sum of the complaint of the London journals is that the present New South Wales Government was elected on a distinct pledge to carry out a free trade policy, but that it protects home manufacturers at the expense of the taxpayers, not by a tariff, but by a trick. Of course American builders too are by this trick shut out of the market, but all accounts received so far are from "opposition" journals, and it is not quite fair to judge the colonial government by them. But some of the difficulties which beset a popular government when it undertakes to own and work railroads appear plainly in this transaction. For nearly two years New South Wales has been trying to get 40 or 50 locomotives, and the government has shown a desire to get the best, but evidently the local pressure has been too strong, and as the result of some business and a good deal of politics the colony will doubtless in the end pay a high price for a poor machine.

A dispatch from Springfield, Ill., states that the United States Grand Jury has returned an indictment against the St. Louis, Alton & Terre Haute for violating the postal laws by conveying in its cars unstamped mail letters and letters not placed in the regular mails. It appears that the specific thing complained of is carrying the letters of the Consolidated Coal Co., which does business in different places along the line of the road. Cases of this kind, which come up occasionally, serve to show the only apparent reason for the existence of the absurd regulation of the postal law which requires railroads to restrict themselves, in the free transportation of documents, to way bills of freight carried on the same train with the goods. Who the complainant is in this case does not appear, though we never hear of action being taken in this direction by government inspectors, who are appointed to look after law breakers. In the case of the Wells Fargo Express, which carried letters by private enterprise in the far west before the government established mail service there, and which through its excellent service and the favor of the communities continues to do it now that the postal service is established, the government practically admitted that public opinion was supreme and dropped the prosecution. A common sense view dictates a similar policy towards railroads which carry *their own letters*, and the modification of the terms of the statute would seem to be proper. Of course favoring anything outside of strict transportation interests is a violation of both the spirit and the letter of the law.

The systematic attempt to prevent the Chicago & Alton from paying commissions seems to be virtually over and to have failed. Without passing judgment on the merits of the controversy, we cannot help regretting the final upshot. The other roads may not be right; the Alton's position, in the long run, cannot be. The effort to stop the payment of commissions on passenger tickets was a move in the right direction, because the payment of such commissions renders it practically impossible to maintain rates. If there are commissions, they will be divided; and when a commission is divided, it practically amounts to a rebate. Of course it is small in amount; but that does not prevent it from producing irritation. The worst of it is that it is a rebate of a kind which the companies themselves cannot help as long as commissions are allowed at all. It makes it possible for the competition of the agents to involve the companies themselves in difficulties. With a pool, this could be prevented. Without it, we see no way of avoiding the liability of a war of passenger rates from this cause. Suppose *A*, *B*, and *C*, three railroad presidents, make an agreement to maintain rates in perfectly good faith. But the arrangements are such that their subordinates can indulge in a little rate cutting on their own account, without the consent of their principals. The matter becomes known and probably exaggerated by rumor. What happens? Each president knows his own good faith and doubts that of the others. *A* thinks that his agents are perhaps doing a little rate-cutting because he cannot help it, but he doubts whether *B* and *C* are so innocent. And *B* or *C* has precisely similar feelings toward *A*. There is a mutual suspicion of bad faith; a strained relation, which may readily result in trouble. What a pool does (and it is almost the only thing which it does) is to prevent this suspicion of bad faith. The slight unsteadiness of rates, which always will exist, does not, when traffic is divided, give rise to mutual suspicion. Systematic cutting of rates may have a sinister object, even under a pool; but the unsystematic weaknesses of agents under such a system do more harm than good to the road which they represent. It does not make so much difference in dollars and cents as it does in men's feelings. The two things do not keep in any rational proportion. A man will sometimes have a hundred dollars worth of bad feelings about fifty cents. A mileage and demurrage allowance for foreign cars never foots up very high; but the amount of recrimination, which it will save if fairly reckoned and paid, is something enormous. Now if we have no pool and pay commissions, our feelings are liable to just this sort of strain. When the matter was brought before the Inter-state Commerce Commissioners they saw that the practice would naturally result in virtual rebates and in suspicions of bad faith, and they allowed the roads to do all they could to suppress it. It may be, as some claim, that its nominal suppression will lead to more underhand practices of the same sort. But we should be sorry to have to accept this conclusion.

Locomotive Fire-Boxes.

The letter on the best method of burning coal which we print on another page, contains a remarkably clear and able account of the best practice in obtaining steam in a locomotive with the minimum consumption of fuel, and without sparks and smoke. Mr. Higginson argues in favor of a brick arch, a fire-box not exceeding 7 ft. in length, short flues, a combustion chamber and a large blast nozzle, in combination with a large admission of air above the fuel. It has long been recognized that bituminous coal, when burnt under forced draft, requires the admission of some air above the fuel, in order to insure perfect combustion, and the only differences between Mr. Higginson's conclusions and those arrived at in the best practice, are regarding the manner in which the air should be admitted and the use of a combustion chamber. The objections to the latter are obvious and will be discussed in a subsequent article. While tubular stays have been largely used, they possess many objections. They must be larger than the ordinary stays, and therefore obstruct the water space, and the admission of cold air near the sides of the fire-box is prejudicial to its life. And it is, moreover, doubtful if such small streams of air have power to penetrate into the centre of the fire-box, where they are needed. It will be found that in the best practice both designers and firemen endeavor to limit and, indeed, prevent combustion near the sides of the fire-box. Complete combustion can only be obtained by a chemical combination between the constituents of the coal and the oxygen of the atmosphere, and this chemical combination can only take place at a high temperature. The cooling effects of the wall of water surrounding the fire-box lessen the temperature of the gases in contact with the sides of the fire-box, and therefore complete combustion only takes place in the centre of the fire-box. One of the great advantages given by the brick arch, is that it can be heated to a high temperature and enables the gases in the fire-box to maintain a high temperature. While the sides of the fire-box cool the gases, the fire-brick arch acts as a reservoir of heat, absorbing the excessive heat and radiating it out when the temperature falls below the average. For this reason the best results,—an evaporation of over 10 lbs. of water per pound of coal, have been obtained in fire-boxes where the sides of the grate next to the sheets have been stopped up with fire-brick,

that no air could be admitted near the sheets and the combustion has wholly taken place in the centre of the grate. This arrangement is impracticable in many instances, in regular work, though it is to some extent applied to Mr. C. Hackney's fine Wootten express engines on the Union Pacific.* On some roads, however, considerable advantage has been derived from an iron frame supporting the grate bars and placed close to the mud ring in order to prevent or minimize the admission of air near the sheets. It is quite possible, as Mr. Higginson argues, that the amount of air admitted through tubular stays, as generally used, is insufficient, and that therefore tubular stays have never come into general use. But on the whole, evidence seems to show that the best point for admitting air is the fire door.

It is evident that the fire door must be opened, and large quantities of air must be admitted above the fire in the operation of firing. This sudden admission of cold air is evidently prejudicial to the tube sheet, and is the fertile source of leaky flues; but we can so moderate the draft and so arrange the brick arch that no cold air can strike the tube sheet, and all air admitted at the fire door must be brought into close contact with the flame, and must be heated by the brick arch. This arrangement utilizes the benefits derived from the admission of air above the fuel, and abolishes the disadvantages. It is evident, further, that if the fire door can be opened not only without detriment but with positively good results, it can be left open all the time, and this is the method of firing, which, generally speaking, has produced the best results. The admission of air through the fire-door while an engine is running secures uniformity in the process of combustion throughout the run, and the act of firing does not imply any prejudicial admission of an excess of cold air. These results can only be obtained when the fire-door is placed in a suitable position with regard to the brick arch and the surface of the fire. If the air from the door can take a direct course over the brick arch to the tube sheet, perfect combustion will not be obtained, for a large portion of the air will only meet the flames when the temperature has fallen too low for perfect combustion, and a large portion of uncombined air will pass off through the flues. When the fire door is below the brick arch and sufficiently near it, a deflector inside the fire door will throw the air down on the fuel and thus insure combustion. It is often urged that deflectors are soon burnt out. This is very true, but there is no part of a locomotive which is more easily replaced, and we may say that there are few parts of a locomotive which can be so cheaply made. It is perfectly possible to shear a thin plate roughly to the proper shape and stamp it to the required curve under a steam hammer, and a few days' work will turn out enough deflectors to last for several months. Another and excellent manner of constructing a deflector is that used on an English line, the London & Northwestern. A secondary brick arch springs from above the fire door to the front of the main brick arch. Any air passing through the fire door must strike this arch before it can get to the tube sheet, and is thus brought into contact with the flame and is burnt or sufficiently heated to prevent any mischief. The evaporation obtained, however, about 9.3 lbs. of water to the pound of coal, appears to show that the combustion is tolerably perfect.

A point of some importance in the design of fire-boxes is the depth. It has been the fashion lately to use shallow fire-boxes with a very large grate area, and the results obtained have doubtless been far superior to those given by narrow fire-boxes where the grate area was wholly insufficient for the amount of coal placed upon it. It is not difficult to understand why an enlarged grate area should give better results. The draft required is less, and consequently the blast orifice can be enlarged, and the back pressure diminished some 5 lbs. to the square inch. This alone gives an increase of some 8 per cent. in the average tractive power of the engine. For the same admission of steam to the cylinders the average effective pressure throughout the stroke is increased by the amount of the diminution in back pressure. The amount of useful fuel wasted by being thrown out of the stack half burnt is also diminished by the large grate, and these and other factors which are readily understood have contributed to make the large, shallow fire-box more economical than the deep fire-box with a small grate.

But the results obtained from the large grate and shallow fire-box still leave something to be desired. An evaporation of 7 lbs. of water per pound of coal is an improvement on the 5½ lbs. obtained with an insufficient grate area, but a further 1½ lbs. can be obtained with coal of an indifferent quality, provided the fire-box and grate are properly proportioned and the fireman understands his business. It is also said that with shallow fire-boxes the ends of the flues are soon burnt out. This is not surprising. The close contact with the flame as it arises from the burning fuel is always destructive. This action is probably due to a variety of causes. The heat is great, and the flame is laden with dust and fine particles in a state of combustion, but which are still solid enough to mechanically cut any body with which they come in contact, and this combination of heat and cutting action is always destructive to any material employed in a furnace. It is well known that many kinds of fire-brick will endure an intense heat from gas that is free from solid particles in suspension, and that other kinds of fire-brick will stand a cutting action but will not stand a high temperature. Fire-brick that will stand a combination of a high temperature and cutting action are unfortunately uncommon, and by analogy it is probable that the deterioration of stay-heads, tube ends and seams a few inches above the fire is due to the same cause. This is, of course, an argument in favor of a deep fire-box. But the more complete combustion rendered possible by a deep fire-box is a more weighty reason. Combustion requires time, and it is evident that a given volume of gases passing through a fire-box of 50 cu. ft. capacity will have twice the length of time to combine when they pass through a similar fire-box, but of 100 ft. cubic capacity. With very fine slack or refuse coal, a grate of large area is desirable, but it has also been found that in burning soft coal of reasonably good quality, the best results are obtained with a grate that is neither too small nor too large for the speed of combustion, and that it is quite as possible to have too slow combustion as it is to have too rapid a combustion. The probabilities are that if it were not for the mechanical effect of the draft in lifting the fire, and so creating sparks, a rapid draft would give the most complete combustion. In other words, the more forcibly the elements are brought into contact the more complete the combination, possibly because there is less time to chill the gases before the combination is effected. A third reason for a deep fire-box may also be found in the fact that in any locomotive with a grate smaller than that used in the Wootten fire-boxes, the fire must to a certain extent be lifted; but if we look into the fire-box of a locomotive working with a large blast pipe, where we know that no sparks are sent out of the stack, and that very few remain in the smoke-box, we find that the sparks that are lifted from the fire either fall back again or are so diminished in size that the majority of them disappear before they reach the flues. Now it is evident that a spark, or rather burning particle, lifted from the fire will be consumed, if given sufficient time. It is already in a state of combustion, and it is surrounded by gases at a high temperature. Directly it enters the flues these gases are so chilled that the small particle of burning coal radiates off heat and ceases to be in a state of active combustion, and therefore if this spark is to be burnt, it must be burnt in the fire-box where the temperature is high, and where a supply of oxygen can be obtained. It would therefore appear that a deep fire-box is much the more favorable for the combustion of sparks: First, because the spark is kept for a longer space of time under conditions favorable to combustion, and, secondly, because it has to be lifted a greater distance from the surface of the fire to the flues. It may, of course, be argued that the distance from the flues to the top of the chimney is very much the same in engines with deep and shallow fire-boxes. But this is hardly to the point. In all locomotives the draft in the smoke-box is very considerably greater than in the fire-box, and a draft which in the smoke-box is quite sufficient to eject a cinder might in the fire-box be only sufficient to lift it 4 ft. and be unable to lift it five.

We have often urged in these pages that the proper place for the prevention of sparks is the fire-box, and that it is far better to have complete combustion in the fire-box and allow nothing to escape from it but gas and impalpable and incombustable dust than to use expensive methods of retaining the sparks at the smoke-box end of the engine. All these methods confessedly do not enable us to make one ounce more steam from the same quantity of coal. They simply have the negative merit of preventing sparks doing mischief, and do not have the positive merit of making the sparks do useful service. They also have the demerit of rendering necessary a stronger blast, which is a direct tax upon the pulling powers of the engine. The benefits of a low back pressure have been again and again insisted upon, and as the back pressure can generally be reduced by very simple expediments which confer a positive benefit in other directions, it is surprising that our master mechanics have not paid more attention to this point. But it will be generally found on examining indicator diagrams from locomotives that have given exceptionally good economical results, that it is the bottom of the diagram and not the top which differs from ordinary practice.

* A general view of these engines and full details of the firebox and grate, etc., appeared in the *Railroad Gazette*, June 15, 1888.

Railroad Earnings, Gross and Net.

In the last issue of the *Financial Chronicle*, gross earnings for the first half of 1888 are given for 108 roads, covering three-sevenths of the total mileage of the country, and pretty evenly distributed over its different sections. The only serious failure in representative character is due to the fact that so many of the large systems west of the Mississippi are late in making their returns. The table in question does not include the Northwestern, the Burlington, the Rock Island, the Atchison or the Missouri Pacific. These roads belong to a class which has been subject to specially adverse influences, and had their earnings been included the general results would have appeared less favorable.

The totals are as follows:

	1888.	1887.	Change per cent.
Gross earnings	$167,196,571	$161,410,753	+ 3½
Mileage	61,852	58,091	+ 6½
Earnings per mile	$2,703	$2,779	− 2¾

The slight increase in aggregate gross earnings is not so surprising as the smallness of the decrease in earnings per mile. It shows that the direct effect of new railroad construction has not been as great as some people have supposed, and that the fall in the valuation of railroad property is quite largely due to the effects of past legislation and apprehensions of further restrictions in the future, as described in our article a fortnight ago. But the figures now before us throw some further light on the way in which matters have worked.

Why should the value of railroad securities have fallen so much when earnings per mile have fallen so little? This is the question for us to answer. It cannot be met by any statement as to the increase of fixed charges; for, though the aggregate fixed charges were increased in order to build the additional 12,000 miles of railroad last year, the fixed charges *per mile* have almost certainly diminished. The change can only be accounted for by increased charges for current expenditure. If gross earnings per mile remained nearly the same, and fixed charges per mile did not increase, there must have been an increase in operating expenses per mile to account for the apparent loss of earning power. Such an increase may have taken place in four different ways.

1. The volume of traffic may have been larger, causing a direct increase in transportation expenses.

2. The conditions under which this traffic were handled may have been less favorable, causing a more indirect increase in transportation expenses.

3. There may have been a special demand for repairs and renewals causing unusual expense for maintenance.

4. A change in the system of accounting may cause items to be charged to current expenditures which were previously provided for at the expense of capital account—that is, by borrowing money.

All these causes have been at work, but the less obvious ones—the second and fourth—have probably had most to do with producing the final result.

It is dangerous to try to answer the question whether there has been any increase in the volume of traffic which should largely increase operating expenses. In a general way there is a great deal of talk about large tonnage at unprofitable rates; and on some roads this is borne out by the facts in the case. Much of the long-distance grain business represents an increase in volume rather than an increase in earnings. If we compare the state of things to-day with that which prevailed a few years ago, and especially if we take only the long-distance traffic into account, there certainly is at once an increase in volume and a reduction in profit. But if we compare 1888 with 1887, such a result is by no means certain. In such figures as we have, there is nothing to warrant the belief that the volume of products to be moved can account for anything like the whole increase in the transportation expense of the country's railroads.

The receipts for the half year of flour and grain at Chicago, Milwaukee, St. Louis, Toledo, Detroit, Cleveland, Peoria and Duluth aggregated as follows:

	1888.	1887.
Flour, bbls	5,971,000	5,505,000
Wheat, bush	16,663,000	27,284,000
Corn, "	45,063,000	36,282,000
Oats, "	36,504,000	29,061,000
Barley, "	6,982,000	7,221,000
Rye, "	983,000	660,000

As we are considering the effect on operating expenses and not on gross earnings, the different value of the various kinds of grain is a matter of no great concern to us. The aggregate change in measure we

find to be from five to six million bushels, according to the method of computing the flour; at the highest less than 5 per cent. of the aggregate. The change in weight is practically *nil*. We have here nothing like a complete explanation of the increased operating expenses. Nor do other commodities show reason for the difference. The half year's cotton receipts were 1,253,000 bales in 1888 against 1,230,000 in 1887; a change of less than 2 per cent., and probably not at all corresponding to the increase of mileage of cotton carrying roads. It is, however, possible, as already suggested, that the conditions of handling the traffic may have had a more unfavorable effect on the expenditures than any change in the volume of traffic itself. The effect of the Inter-state Commerce law undoubtedly has been to make local rates relatively lower in proportion to through rates. The tendency, of course, would be to increase the proportion of local traffic; and as far as we can judge from the reports hitherto received, there has been a most decided change in this direction on many roads. Now, some railroad men have all along contended that the rates for large trade centres in the past, though apparently unfairly low, were not so in reality; that the difference in economy in handling through and local traffic, in a variety of indirect ways, was enormous. We always supposed that any basis of truth in this reasoning, whatever it was, was much exaggerated; but the existing facts seem to lend much countenance to this view. If under the operation of the Inter-state Commerce law, the proportion of local business has increased while at the same time net earnings have diminished, the result is, to say the least, noticeable. If any railroad official can collect figures bearing on this point in such shape as to be available, he will make an important contribution to a disputed matter of traffic economy, important alike to the officers and to the public. It is not unlikely that the future development of railroad law would be considerably affected by any clear presentation of these facts.

Of extraordinary expenses for repairs and renewals there is no great amount of evidence. Some roads have required a good deal of new rolling stock to handle their traffic, but this expense was incurred in 1887 quite as much as in 1888. There were no such variations in track repairs as occurred a few years ago, before steel rails had become universal. If anything, there is perhaps a disposition to economize in this matter just at present.

But of extraordinary *charges* for these purposes there has been a great deal in the past year. The New York Central and the Lake Shore are pretty well committed to the policy of charging all ordinary improvements to current account instead of to capital. Many of the Western roads show a decided progress in the same direction. The difference in what is done is perhaps not so striking as the difference in the manner of doing it. A few years ago, when it was done at all, it was done ostentatiously; to-day it is done quietly. The old practice in such cases was to give a figure of net earnings, then to appropriate a certain sum as a "renewal fund" or its equivalent, and after this deduction to divide what was left. The New York Central to-day uses no renewal fund machinery for compassing this object. It makes the net earnings at once appear as low as possible, by deducting everything which it can under the general head of operating expenses.

The motives for keeping capital account down are obvious enough. They are simply principles of common conservatism in business—of double force in the case of a road like the New York Central, whose general balance sheet bears the marks of such a different policy in times past. But the reason for doing it without the intervention of special renewal accounts is different. It arises from the desire to make the earnings appear as small as possible to the outside investigator. Large figures of net earnings, whether they are all actually divided or not, tempt parallel railroad construction on the one hand, and hostile legislation on the other. Our railroads have suffered so much from both of these evils that it is no wonder that they try by all possible means to guard against them. But to deceive the outsiders effectively, they must to a large extent deceive their stockholders also. That a change of policy in the matter of charging improvement expenditures does have that effect, there can be hardly any doubt. There is, at least, the consolation of knowing that if they are to be deceived at all, it is better that it should be in this direction than in the other.

On the whole, it is safe to say that the fall in net earnings is not fully accounted for either by the changes in gross earnings or by the more direct and obvious reasons for increase in expenditure, and that it must to a considerable extent be due either to changes in railroad economy, which were the result of legislative action, or to changes in the methods of accounting, due in great measure perhaps to fear of such action in the future.

June Accidents.

Our record of train accidents in June, given in this number, includes 64 collisions, 76 derailments and 3 other accidents; a total of 143 accidents, in which 40 persons were killed and 125 injured.

These accidents are classified as follows:

COLLISIONS:		
Rear	33	
Butting	23	
Crossing and other	8	
		— 64
DERAILMENTS:		
Broken rail	1	
Loose or spread rail	5	
Broken bridge	3	
Defective switch	3	
Broken wheel	3	
Broken axle	4	
Broken truck	1	
Fallen brake-beam	1	
Broken draw-bar	1	
Train breaking in two	1	
Misplaced switch	6	
Bad loading	1	
Cattle on track	6	
Landslide	1	
Accidental obstruction	2	
Purposely misplaced switch	2	
Unexplained	35	
		— 76
OTHER ACCIDENTS:		
Boiler explosion	1	
Broken draw-bar	1	
Miscellaneous	1	
		— 3
Total number of accidents		143

The causes of collisions where given were as follows:

	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	5	..	..	5
Misplaced switch	4	2	..	6
Failure to give or observe signal	..	..	..	..
Mistake in giving or understanding orders	..	1	..	1
Miscellaneous	5	2	..	7
Unexplained	19	18	8	45
Total	33	23	8	64

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road	..	12	..	12	8
Defects of equipment	6	11	2	19	13
Negligence in operating	13	7	..	20	14
Unforeseen obstructions	..	11	1	12	9
Unexplained	45	35	..	80	56
Total	64	76	3	143	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P.c
Passenger	27	23	1	51	26
Freight and other	90	54	2	146	74
Total	117	77	3	197	100

The casualties may be divided as follows:

KILLED:	Collisions.	Derailments.	Other.	Total.	P. c.
Employés	12	15	3	30	75
Passengers	3	2	1	6	15
Others	..	4	..	4	10
Total	15	21	4	40	100
INJURED:					
Employés	24	43	..	67	54
Passengers	6	47	..	53	42
Others	4	1	..	5	4
Total	34	91	..	125	100

Twenty-four accidents caused the death of one or more persons, and 32 caused injury but not death, leaving 87 (61 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with June, 1887, shows:

	1888.	1887.
Rear collisions	33	26
Butting	23	12
Crossing and others	8	5
Derailments	76	42
Other accidents	3	3
Total accidents	143	88
Employés killed	30	13
Others killed	10	3
Employés injured	67	37
Others injured	58	63
Pass. trains involved	51	32
Average per day:		
Accidents	4.76	2.93
Killed	1.33	1.87
Injured	4.17	3.33
Average per accident:		
Killed	0.280	0.182
Injured	0.874	1.136

Of the 7 collisions due to miscellaneous causes, 6 undoubtedly resulted from negligence in operating, and the same proportion would doubtless hold good for those classified as unexplained.

The totals for the month are again large, though there were no notable accidents like the half dozen in 1887. It is noticeable that of the six passengers killed five were in places acknowledged to be somewhat unsafe. One was in a caboose, where the risk is admittedly considerable, and two were on the engine, where it is greater yet. Two were on the car platform, one in Washington territory and the other in New York state; both were, perhaps, legitimately in the places where death overtook them, and yet neither case will prevent the road from asserting that it has carried certain millions of passengers without injuring any of them in the cars.

The most fatal accident of the month was on the Pennsylvania, where ten Hungarian gravel-train laborers were killed or fatally injured. On the New York & Northern four ignorant Italian laborers were struck and fatally injured by a train. While in the latter case, and possibly in the other, the victims were more or less blameworthy, the killing of 14 men in one month—a greater slaughter than that at Hohokus last year—should emphasize the query whether these ignorant people are treated with the consideration that is demanded by the impartial law which tells us that one man is as good as another.

The smash-up at Amsterdam, N. Y., the 21st, was notable because the air-brake was in use on part of the train, and it has been suggested that the automatic brake should not be used except on trains that are fully equipped with it. In this case the forward part of the train got far enough away before the automatic brake stopped it, to make the collision which ensued when the rear (unbraked) portion overtook it, rather serious. What the distance between the two parts of the train was is not accurately stated. The cars were Cbicago, Milwaukee & St. Paul stock cars, and there was an empty platform car a short distance behind them. Whether the gap between the parts was small or great the result of a mishap of this kind would undoubtedly have been serious in any event, as experience at the Burlington trials with slack couplings showed. On the other hand, while the quick action of the brake precipitated the collision in this case, there is no telling what equally bad or even worse results might have ensued from a similar breakage in a train made up under old conditions. Certainly the cases of trains parting which result in a worse wreck than this one, while much less numerous than those which are harmless, are frequent enough. And it is quite possible that even of this class of accidents, and with mixed trains, the power brake will prevent more than it will cause. However that may be, the need of a power brake for freight trains is now so fully recognized that nothing will be allowed to greatly hinder progress toward its general adoption. But, further than this, we need the brake at once. We cannot have all cars equipped at once, we cannot keep in separate trains those which are equipped, and we cannot afford to put on cylinders and pipes and let them lie idle for five or ten years. A chief advantage of the power brake lies in its effective relief to the trainmen in cold weather and the added safety to trains in the descent of long and steep grades, like those of the Pennsylvania, the Erie and other roads. This advantage can probably with care be availed of with tolerable safety even with such a train as that at Amsterdam, as the slack of a train descending a grade can be kept closed up and the danger of shock practically obviated. The true remedy, however, is prevention; trains and cars should be made so as not to break. We have received a photograph of the broken cast-iron drawhead that occasioned this collision, and it plainly shows a large air hole, which was doubtless caused by an iron nail used to hold the core in the mold, and which was imbedded in the casting at the point of fracture. It has been found profitable to have the draw-bars (as well as other parts) of passenger cars made in the best manner from the best material, and to maintain careful inspection. Who shall say that similar attention will not pay on freight cars? A number of roads have already for some time utilized air-brake cars by placing them in the front of the train and graduating the speed with them, and they will not be inclined to deprive themselves of the known benefits from this practice. It will be remembered that the Atchison, Topeka & Santa Fe puts temporary pipes under unbraked cars; thus obviating the necessity of placing all the brake cars in the front of the train.

There are two other accidents in the month's record which illustrate phases of the changed conditions to be expected from the adoption of improved devices. On the Lehigh Valley a truck was derailed and completely cleared the track; the car body was held up by the coupling and a wreck apparently averted. With all the advantages of vertical plane couplers no one will probably claim that they will enable a car to support half the weight of the car next to it. On the Pittsburgh & Western, a heavy freight train descending a steep grade got beyond control and was wrecked, apparently because too much dependence was placed upon the driver brakes of an engine at the rear. "Conservative" men can say here, that if the hand brake had been the only dependence, the disaster would not have occurred.

At Fan Bay, Mich., an engine was purposely derailed by the Duluth, South Shore & Atlantic, at a point where the Chicago & Northwestern was trying to put in frogs for a crossing. There was an exciting crossing "collision," but not of engines or cars. The Northwestern finally succeeded in laying its frogs.

In Mexico a construction train was derailed near a bridge at Tampico by a cow and a donkey which were on the track. The train crushed through the bridge and went down an embankment. The reports stated that 18 persons were killed and 41 injured.

Pig Iron and Blast Furnaces for the First Six Months of 1888.

Both the *American Manufacturer* and the *Iron Age* publish estimates of the production of pig iron for the first half of this year. The first puts the production at 2,950,399 and the second at 2,984,171 gross tons. The production of the first half of 1887 was 3,049,295 gross tons, and if the mean of the two estimates be taken, our production has decreased at the rate of 2.7 per cent., whereas the product for the first six months of 1887 showed an increase of 14 per cent. over that of the same period in 1886.

The figures, as given in the *Iron Age*, are as follows:

	First half of 1887. Gross tons.	First half of 1888. Gross tons.
Anthracite	1,072,716	843,275
Bituminous and coke—		
Pennsylvania	691,329	697,321
New York	6,562	12,711
Southern States	320,021	372,310
Ohio	404,342	471,299
Western states	321,604	347,649
Total bituminous	1,743,670	1,901,281
Charcoal	235,354	239,615

The decrease in the production of anthracite pig, 21 per cent., has been general in New York, New Jersey, Pennsylvania and Maryland, and it will be noticed that the advance in the production of bituminous and coke pig has, as taken by groups, been general, but there has been a slight decrease in the make of Georgia, Tennessee and Kentucky, while Maryland has made none the past half year. There is also a decline in the make of the Pittsburgh region, the Hanging Rock region of Ohio, and in Indiana, Wisconsin and Colorado. Alabama has increased her output from 83,770 to 121,087 gross tons.

The *American Manufacturer* gives the following tables of furnaces in and out of blast July 1:

	In blast.		Out of blast.	
Fuel.	No.	Weekly capacity.	No.	Weekly capacity.
Charcoal	68	12,753	104	12,161
Anthracite	96	28,176	104	27,173
Bituminous	119	74,743	103	52,743
Total	283	115,672	311	92,077

NUMBER OF FURNACES IN BLAST.

	July 1, 1887.		Jan. 1, 1888.		July 1, 1888.	
	No.	Weekly capacity.	No.	Weekly capacity.	No.	Weekly capacity.
Charcoal	77	13,969	73	13,237	68	12,753
Anthracite	136	37,662	117	35,259	96	28,175
Bituminous	101	57,355	151	92,224	119	74,743

Thus the number of furnaces in blast and their weekly capacity has decreased since Jan. 1, as follows: Charcoal, 5 furnaces and 484 tons. Anthracite, 21 furnaces and 7,083 tons. Bituminous, 32 furnaces and 17,481 tons: or 58 furnaces and 25,048 tons in all.

The *Iron Age* has made an analysis of the probable availability of the blast furnaces which are blown out, and divides them into two classes, those that have been out of blast less than six months and those out of blast over six months. The results may be tabulated as below:

	Over six months or more.		Temporarily idle.	
	Number.	Weekly capacity.	Number.	Weekly capacity.
Anthracite	72	15,232	23	7,047
Bituminous	46	19,784	45	25,667

These are the concerns which a late number of the London *Ironmonger* referred to, saying: "These enterprises are exotics, often badly located and generally financed under hothouse conditions. In the sunshine of general prosperity they appear to do well, but any general shock means death to most of them." Or, it might be stated from another point of view, they are the militia of our productive forces. There is in this country no such aggregation of capital in the iron trade as in England, and our furnace-men, instead of continuing production in the face of declining demand and accumulating four or five months' supply in public stores, as is the case there, blow furnaces in or out in conformity to the state of the market, so that there is seldom over a month's supply outside of users' hands, and at times the stock has been very near two weeks' supply.

As illustrating the steadying effect on prices of our increasing number of exotic or irregular furnaces, furnaces which are promptly closed on a fall in the price of pig iron, the range of average monthly prices of pig iron, as given in Mr. Swank's "Statistical Abstract," for the last three "booms" may be quoted. Commencing in January, 1871, the price was $30.50; in June, 1872, it reached its maximum, $53.37. In January, 1879, the price was $17.25, and in February, 1880, the maximum of $41 was reached. In January, 1886, the price was $18.50, and through January and February, 1887, the price—the maximum for this last boom—was $21.50.

It will be interesting to compare these prices with those in England for the same period. The fluctuation here in 1879-80 was extreme, from $17.25 to $41. In England, Glasgow warrants were, according to Ryland's Iron Trade Circular, on Sept. 6, 1879, 44s. 2d., and on Jan. 24, 1880, 70s. This was less than half the range here. But in March, 1886, the price was 37s. 11d., and in 1887, 45s. 7d., a range nearly one quarter greater than in this country. The fall from the maximum price of one boom to that of the other, was from 70s. to 45s. 7d., or 24s. 5d. in England, equal to 35 per cent.; in this country the fall was from $41 to $21.50, equal to 49 per cent. The figures, as will be seen, are not conclusive that our irregular proceedings in blast furnace economy are more conducive to steadiness in prices than the habit of sending large stocks to public stores, which obtains in England, but it is much more economical in the matter of interest charges, and probably will be practiced even if our iron masters should attain to the capital and credit of those of northern Great Britain.

The advent of a new type of steamer plying on the waters of New York Harbor in connection with the Sandy Hook route to Long Branch and the Jersey coast is an event of more than ordinary interest, as it marks a distinct step forward of over thirty years in practice as compared with the other boats running in the same service. The last boat, the "Cape Charles," was built only three years ago, and has a walking-beam engine with the usual single cylinder worked by the usual arrangement of tappet valves. The new boat, "Monmouth," has twin screw triple expansion engines, and carries a pressure of 160 lbs. in the boilers. In the "Cape Charles" the whole propelling force of the single cylinder throws on the gallows frame which carries the walking beam a strain alternately upwards and downwards of double the amount of pressure on the piston. In the "Monmouth" the propelling force is divided among six cylinders, and no alternating strain exceeding the pressure on one of the six pistons is brought on any one bearing. This alone is a great improvement, and might be expected to greatly diminish the vibration of the boat. The superior economy of compound engines has been fully explained in these pages, and is now very generally recognized, and it is only surprising that they have not been more largely used in shallow draft steamers running to New York. The improvements in the "Monmouth" extend not only to the engines and means of propulsion, but to the general arrangement of the boat, which, with a few exceptions, is well adapted for its service, and more skillfully and carefully arranged than the boats built a few years ago. The vessel possesses ample space in every direction. This is partly due to the small amount of space taken up by the engines, but is chiefly due to the more skillful design. The dining-saloon and the wine-room are situated in the hull of the vessel below the main deck, and thus the space occupied by these little used apartments can be devoted to increasing the accommodation of the 1,500 odd commutors who journey to and fro between the seaside and New York by the "Monmouth," "St. Johns" and other ships on this service. Some small improvements in matters of detail would, however, considerably increase the speed and convenience of the service. The time-table might be made more in accordance with the actual performance of the steamers, for at present from 10 to 20 minutes is invariably lost on the comparatively short trip from Long Branch to New York. A great deal of this time is lost owing to the bad facilities for landing passengers. When 1,500 people have to descend an unnecessarily narrow flight of stairs with sharp rectangular corners and have in addition to pass over one gangway that will barely admit three abreast, it takes some time for passengers to go aboard and disembark. The gangways are also constructed on a faulty principle. They are unnecessarily long, and are slung from overhead by means of block and tackle. A shorter and wider gangway balanced on large wheels in the centre would be found more convenient and more quickly and easily managed Arrangements are being made by which passengers can land at the New York end at a high level, instead of walking on the pier and threading their way between bales and teams. It is somewhat singular, however, that these improvements were not effected at an earlier date, for at present, in the height of the season, the pier is almost blocked with sticks of timber which will be in position ready to carry travelers during the winter months, when such extra accommodations will be wholly unnecessary.

The high speed expected from the new boat has not yet been realized, probably owing partly to the fact that her engines are new and hardly yet worn smooth enough to enable them to show what they can do. The quickest passage of which we have any information, taken after fairly leaving Sandy Hook to stopping the engines at New York, was 1:04, which is equal to 16.3 knots per hour. The boat makes very little wave at the bow, but is followed by a large wave at the stern. Her poor performance is, therefore, partly due to a defective model, for while the bow is sufficiently fine, her stern is somewhat full, and hence the screws do not get a sufficient supply of water. It is well know that in screw steamers a fine run aft is of especial importance, while with paddle steamers a fine run forward is more essential. The expectations of the builders were that the passage could have been made in 50 minutes from pier to pier, or some 16 minutes less than the actual time, as given above. This is a somewhat serious difference, which will probably be diminished another season, when the engines can be worked to their full power.

The ordinary commutation ticket in this country is simply an aggregation of a definite number of rides, and some record is kept of every journey taken—either the ticket is punched or a coupon is torn out at every trip by the conductor. These protections are, of course, primarily intended as safeguard against fraud; but they are a constant annoyance to the passenger, and many quiet, uncomplaining ones often wish for the good old times when "their face was their ticket." These passengers (not the cross-grained people who constantly bother the conductor and grumble at the regulations—we will not now consider them) would appreciate a simplification of the ordinary system. Fraud on the part of a habitual traveler is not so likely as with a transient passenger, and can be more easily detected, and if detected is attended with more serious consequences to the passenger.

On the New York, New Haven & Hartford passengers still pass by simply showing their ticket, but even this seems unnecessary if the conductor knows the passenger. In England, where the number of commuters is very large, the system is also radically different from the common American practice, being similar to that of the New Haven road, though still more liberal. A ticket entitles the commuter not to a definite number of rides, but to ride at any time and as often as he pleases within a definite time. Consequently no record is taken of the trips and the railroad company has only to guard against the passenger traveling beyond the points between which his ticket is available and after the time at which it expires. The ticket is, therefore, generally in the shape of a small memorandum book, covered with leather, when open measuring about 2½ in. by 3 in., and on the outside is marked prominently with the stations between which it is available, the date at which it expires, and the class of carriage in which the holder can travel. As these tickets are issued on the first of the month, for periods of either one month or three, six or twelve months, a special examination is generally made of each ticket at the commencement of the month. The collector takes each ticket in his hands to insure against forged tickets or split tickets, cases having been known of a ticket being divided in this way and made to serve for father and son. But after that the English practice is simply to look at the passengers, and if they are recognized as holders of commutation tickets to let them pass without producing the tickets. This saves a great deal of time and trouble, and is very much appreciated by the regular travelers. It is, of course, open to fraud. A regular ticket holder might lend his ticket to his wife, or some other relative. The possession of an old ticket by a person not recognized would, however, arouse suspicion, and in order to effectively guard against this a special gang of men are employed who visit different parts of the system at irregular and unexpected intervals and strictly examine all tickets. As these men are paid a percentage on the fares they obtain, they are generally very watchful of any irregularities, and if any willful attempt at fraud appears evident, the offender is prosecuted and very possibly his name appears in the newspapers, whilst his initials and the amount of his fine are printed in a handbill and are posted up at every station on that particular road.

This inspection system is an added expense, of course, and the coupon plan admits of the employment of conductors with only a moderate endowment of knowledge of human nature; but there can be little question that a small additional expenditure for first-class conductors and for inspectors would have a large effect in pleasing passengers, and they must be pleased in the long run, if their patronage is to be retained.

Paternalism appears to be increasing among railroads in their treatment of passengers as well as in the relations of the state and National governments toward the railroads. The practice of telling passengers that they mustn't leave their hand baggage in the car on alighting (or of predicting in their hearing that they are not going to commit that blunder—"Passengers *will* not leave packages," etc.), seems to be the latest "fad" and to be spreading. Whether free Americans, possessing inalienable rights to the pursuit of happiness and other things, will tamely submit to having this gratuitous assumption that they don't know their own business flung at them by the ordinary brakeman-elocutionist every time they journey by railroad remains to be seen. Railroad officers who own telegraph stock should bear in mind that when they instruct their brakemen to jog passengers' memory in this manner they are taking the bread out of their own mouths; and the train-telegraph will have a specially poignant grievance, for if passengers do not leave umbrellas and packages of dry goods in the cars there will be no occasion for their recollections to jump up suddenly between stations and demand to send a message at once. Perhaps this lengthening of the brakeman's speech will lead to giving more care to perfecting it. Certainly it is to be hoped that many of them will have their announcements either curtailed to nothing or else amplified so that training *must* be given on the point. One superintendent who has adopted the don't-leave-your-hat rule has for a long time instructed his men that "the object in making announcements is not to make a noise, but to tell the passengers, in the English language, the name of the station," etc. Whether the men are tested to see that they cheerfully agree with this dictum is not stated. The only way to make sure that an idea of this kind gets into a brakeman's mind is for the superintendent himself or a very careful assistant to stand by and see it "go in at one ear and out at the"—mouth. Mis-enunciation seems to be reformed very slowly, if at all. Those brakemen who naturally speak clearly seem often to think that careful enunciation in the line of duty would be looked on as putting on style, while others, perhaps, think that to take much pains to give information would be to sacrifice some of the dignity of an American citizen. Even on the Elevated road in New York City, where unusually good discipline prevails, some of the brakemen seem to be utterly incapable of pronouncing English. They do not by any means appear to be late arrivals from Germany, and their un-English principles of pronunciation seem to be confirmed. Of course, not one passenger in a thousand needs the announcements on the Elevated, but this is true in a slightly less degree on all railroad trains. Unless we are ready to give careful announcements for a very few passengers we may as well entirely abolish giving them.

The editor of one of the railroad papers has lately taken a long journey on "one of the great transcontinental lines," during which he was much annoyed by "four persons who spent nearly the whole of every day and evening playing cards." They were slangy, they were noisy, they slapped down their cards and asked "what's trumps?" and evidently they were very vulgar. Judging from the cries they are reported to have uttered they must have played at least two different games at the same time, and when some of the passengers tried to write or to read "the peals of laughter and the calls of triumph or despair from the players broke into their ears, at frequent intervals, and severed the threads of thought in an instant."

Prompted by this unfortunate experience the editor says: "We urge that card playing in public railway cars, and especially in sleeping cars, is an evil and a nuisance and ought to be abated — by common consent and custom if possible; by enforced regulations if necessary. He is led to his conclusion because first, "loud talking, laughter

and excitement are the natural and usual accompaniments of this diversion, especially among people lacking in refinement and devoid of mental resources, who are most likely to employ their leisure hours in this manner;" and second, it is a poor way to spend the time in traveling. A journey covering "half or a whole hemisphere" affords means of mental and spiritual improvement that are lost to those who are "intent on each turn of the bits of pasteboard."

We will not consider what might be accomplished in a journey of "a half or a whole hemisphere," because about 53 degrees of longitude is as much of the earth's surface as can now be spanned in one unbroken railroad journey; but we submit that this is a question of manners rather than of specific modes of recreation. Some people cannot read on the cars, and a good many ought not to do so habitually, or for more than very short periods, and it is not very unusual to find people who cannot look out of the windows of a moving train without suffering in various ways from the tax on the mechanism of their eyes. These unfortunate people sometimes get tired of talking and thinking, and, if their educations have not been neglected, find in card playing an agreeable relief from the tedium of a long journey. All passengers have a right to be protected in the enjoyment of quiet; but those feeble intellects which find amusement in cards must be considered, as well as the stronger minds which find occupation from Chicago to San Francisco in "observing the decay of barbarism and the progress of civilization." The notions that loud talking is the natural accompaniment of card playing, and that "people lacking in refinement and devoid of mental resources are most likely to employ their leisure hours in this manner" we will not stop to discuss. Talleyrand and the accomplished William Pole, F. R. S., Mus. Doc. Oxon., were neither vulgar in manners nor devoid of mental resources, and it is pretty safe to say that the best whist players of our own generation and country are to be found amongst the ablest, most learned and most refined of our professional men. Card playing as a rational amusement can be left to take care of itself. The question is whether or not it should be prohibited on railroad trains. There are two classes of trains particularly on which it would seem especially proper that it should be permitted under proper restrictions against gambling—long journey trains, and suburban trains much used by commuters. On the latter, passengers and conductors get to know each other so well that there is little or no chance for professional gamblers to operate, and on the former sharp conductors would probably find little difficulty in keeping matters straight; and on both it is very desirable to permit some amusement for those who cannot or will not read on the cars, and who seek rest and amusement.

In November, 1887, the French Government submitted to the Chamber of Deputies the draft of a bill for improving the port of Havre and the lower Seine. A commission was appointed to make a study of the subject, and recently M. Albert Besson has submitted the report of the commission, outlining a plan for the work and giving estimates of the cost. The chief interest in the matter lies in the fact that the port of Havre in its present condition cannot compete favorably with Antwerp and Hamburg, although it is the only port on the northern coast of France which is available for large transatlantic craft. The existing entrance to the harbor is narrow and crooked, and has a depth of but 26 ft. at high tide. After passing the mouth of the harbor, the channel of the outer port turns at an angle of 90°, and is so narrow that all other movement of vessels has to be suspended during the slow progress of a great ocean steamer through the channel in entering or leaving the harbor. In view of the competition of the German ports it is thought of the highest importance that the harbor should give ample facilities for the largest modern ships. The project of the commission is to create an outer port with an area of nearly one square mile, having two entrances. One of these, with an opening of 500 ft., facing the southeast, will be situated on the line of the present entrance; the other, with an opening of 900 ft., will be about one mile further north, facing directly east. This channel can be dredged to give a depth of 28 ft. for 17 hours of each day. The channel on the southeast will also be dredged to give a depth of 31 ft., and will be straightened in plan. The estimated expenditure for these works in the port of Havre will amount to about $14,600,000, and if the project for the improvement of the lower Seine is carried out a further expenditure of about $4,600,000 will be required. Although these sums are formidable, it is argued that the competing ports of Rotterdam and Amsterdam have been improved at an expenditure of $40,000,000, and that a further sum of $12,000,000 will shortly be laid out on their improvement, while at Hamburg the total sum of $34,000,000 has been expended, of which $24,000,000 was furnished by the state of Hamburg and the rest by the German government. The proposition of the commission is, that the money for these improvements of the port of Havre shall be provided by a subsidy of $3,600,000 furnished by the Chamber of Commerce of Havre and by $11,000,000 in securities of the French government.

A bill to facilitate the construction of a tunnel under the English channel has been defeated in the House of Commons by a majority of nearly two to one. A joint parliamentary committee examined the question very carefully some years ago and reported adversely on any tunnel, mainly on the ground of the danger of invasion. An experimental length has been bored some distance under the sea and apparently the construction of the tunnel is perfectly practicable, and any serious leakage or irruption of the sea seems unlikely. The French approve of the tunnel, and on the 26th of June last, M. Léon Say, President of the French-English Submarine Railroad Co., addressed a letter to Mr. Gladstone, expressing his satisfaction in learning that the House of Commons was to take up the consideration of the question of the channel tunnel between Dover and Calais, and that Mr. Gladstone would take part in the debate. M. Say said that the French company had made all necessary preparatory studies, and was ready at once to begin the work. They consider that there was no technical difficulty which was unknown and had not been provided for, and that the question had never before appeared in so favorable a light. Mr. Gladstone answered that he should do what he could to promote the bill, and that he was ashamed of the way in which this great project has been received for several years on the English side of the channel. The ventilation would probably be a serious difficulty, and an efficient means of supplying air and removing smoke would be absolutely necessary. The great objection to the tunnel has, however, been on military grounds. It is argued that however carefully watched and guarded, a small body of resolute men might seize the land end and hold it until heavy reinforcements arrived via the tunnel. This dread of invasion seems strange to an American, but close proximity to restless neighbors armed to the teeth is never exactly pleasant to the average peaceful citizen. The tunnel would probably pay and would facilitate trade between England and the rest of Europe, but it appears to be felt that these advantages would hardly balance the risk of an invasion. The best authorities agree that the best appliances for preventing a surprise, flooding the tunnel, etc., might prove inoperative, and the "silver streak" will therefore remain a barrier against the passage of a French locomotive and the armed hosts it might bring in its train.

"A Railroad without a Time-Table" is the title of an article going the rounds of the papers. It originated with the *Pathfinder Guide*, and alleges that the Boston & Providence has never printed the time of trains either for the public or its employés, except for the terminal stations. So far as the public is concerned this is partly true, but the employés table did not leave the men to guess at the time they should start from way stations. This is, indeed, admitted by the article referred to when it says that by pumping the information could be got from trainmen. The time-tables were old-fashioned and somewhat clumsy; but they were time-tables. The Old Colony has, since taking possession of the road, adopted more modern forms. New England roads have some ancient notions, but, after all, they may be said to "get there," after a fashion; at any rate, the train running from Boston to Providence (44 miles) in one hour does fairly well. We presume that it does not need more than two or three times at any one station, and its runner probably takes but a faint interest in rule 21 of the uniform code and the exhaustive discussion it has received. The credit given by the *Pathfinder* to Superintendent Marshall for making a new table must be counted as "gush." Making an entirely original table involves the writing of a large number of figures; but as an intellectual feat it is not extraordinary.

The situation in meat rates just now rather reminds one of a trick played by Commodore Vanderbilt some fifteen years ago. At that time rate wars were a more reckless business than they are at present, and in the course of events the Erie once brought its live stock rates down to a dollar a car-load. But the old Commodore had agents of his own in Chicago who quietly made extensive contracts for shipments at that rate. When everything had been made secure on this side he restored his own rates to a paying figure, and did whatever business came into his hands by shipping over the Erie at a dollar a car-load. This state of affairs lasted some time, to the great delight of the Commodore, and the intense disgust of the Erie people. These latter might make such rates as they pleased, but it would have required very sharp figuring to name a rate which should give them any profit on the transaction. It is not in railroading alone that such things happen. A hardware merchant, in an active war of prices a few years ago, finding that rates were five cents below cost, bought a large stock of his opponents goods and cut rates one cent more. His opponent met the cut. The merchant first named bought another supply at the reduced rate and cut again. And so it went on, one man being certain of only losing one, or, at most, two cents, and having fun enough to pay for it, while the other was increasing his losses in rapid progression. Such are the beauties of really active competition.

Watermelons constitute the latest bone of contention. This traffic, now grown to enormous proportions, began by water lines but is now shared by the railroads, the arrivals in New York city from Florida and Georgia during two days last week being 90 car-loads by steamer, and 24 by all-rail lines. It appears that until recently a "car-load was a car-load," the time-honored practice of estimating a car packed to the roof as 10 tons being universally in vogue, and the consignees correspondingly happy. Now the Pennsylvania, or some other hard-hearted road, has had the audacity to weigh a car and charge for 40,110 lbs.; hence the trouble. The commission merchants find that their remittances to the shippers are so small that it would have been money in the grower's pocket if the melons had never been allowed to cumber the ground. The yield this year is enormous, and the station agents in the South have been perplexed to get cars enough. Former conditions are completely changed; in our boyhood's days methods of transportation caused little anxiety, the difficulty was in selecting a "feasible" source of supply.

Tare, or weight of cars empty, is a constantly perplexing question where track scales are not plenty, as the rush of business characteristic of many yards renders the work of weighing empty cars so irksome to the yardmaster that he shirks it when he can. Accurate weights are ascertained and reported with facility only where there is a regular system and enough business to keep it lubricated. The most complete provision for this demand that we have seen is a list issued by the Southern Railway & Steamship Association, giving the *capacity* in pounds for each one of over 4,000 cars of the Union Tank Line. Capacity is not tare, to be sure; but as oil tanks are always loaded full, the desired object is attained in a very simple manner. Showing these capacities on a sheet convenient for the desk as well as in painted figures on the car is particularly desirable in the case of oil cars on account of the discoloration of the whole outside of the car and tank by oil and dust within a short time after putting the cars in service.

The actual effect of a 30 per cent. dynamite cartridge on a locomotive is not generally known, and the following evidence on this point at the inquiry into the dynamite plot on the Chicago, Burlington & Quincy is interesting:

"W. B. Thomas, of Anchoria, a locomotive engineer, was pulling train No. 17 on the night of May 29 through Aurora. At 10:40 p. m., when about a mile from Eola, he heard a loud report and saw a very bright light, like an electric light, flash up beside the cab. The jar of the explosion knocked off the headlight and the cab light and cut one and a half inches from the flange of the right forward truck wheel. Witness felt the shock for two days after. The train ran into Aurora without stopping, and the full extent of the damage was only discovered then.

"John Queenan, another engineer, had a similar experience on the night of June 14, while running between Aurora and Streator, a half mile west of South Aurora."

General Superintendent Gannon of the Staten Island Rap'd Transit Co. has issued a circular to heads of departments and all employés, congratulating and complimenting them on the efficient manner in which they performed their duties on July 4, when they handled 85,000 passengers without a mishap of any kind. To all who assisted in carrying out the work double time will be allowed. "This is," says a New York paper, "a substantial way of showing appreciation, and the company will lose nothing by it." Quite likely the men worked double hours as well as double strength, and so deserve double pay as a mere act of justice; still we agree with our contemporary that the circular itself is a "substantial" recognition of faithfulness. Words are not empty when they come from one who is known to mean what he says.

The Arrests at Chicago.

The principal feature of the news from Chicago during the past week has been the confessions made by Bowles, one of the men arrested for carrying and using dynamite, and of some of the others. The exact nature of their statements is not made public, however. Mr. Arthur has visited Chicago and had some negotiation with the officers of the Burlington road, but nothing of importance transpired.

On Friday the United States District Attorney announced that he should prove that Bowles put dynamite on the track near Aurora, May 29, and that Hoge knew of the scheme. Evidence was also promised concerning the movements of Bowles, Bauereisen, Smith and others for a fortnight subsequent to that time. Other facts had been unearthed which went to make a strong chain of evidence. J. J. Kelly, secretary to Hoge, told how Bowles had brought dynamite to Hoge's room in the Grand Pacific Hotel, and a storekeeper in Noblesville, Ind., testified to having sold dynamite to Bowles.

On Saturday Bowles made a full confession to the District Attorney and the railroad officers. The reports indicate that there is much excitement in Chicago, and some of the Brotherhood men continue their assertions that the railroad company or detectives, or both, are playing a game to entrap them. Much defiance of the road and threats of boycotting and universal strikes and other methods of revenge are freely made. The railroad company has police in the yards and a squad goes with every train transferred to the yards of other roads. Two young men who went to Western avenue and Indiana street to take a photograph of the engine wrecked by a mob at that point on Wednesday night, were set upon by roughs and brutally beaten. They were chased for some distance, but finally escaped with their negatives, leaving their apparatus behind.

On Monday of this week there was a conference between officers of the Burlington road and Messrs. Arthur, Sargent, Hoge and Murphy. All parties are non-committal as to the results of this conference, but it seems probable that the cooler heads in the management of the striking organizations are disposed to surrender. General Freight Agent Morton is reported as saying that the road will probably take back 150 of the better class of the strikers, if they give in. Mr. Arthur said, as was of course to be expected, that neither he nor the Brotherhood as an organization countenanced any violence whatever. On Monday Bowles went with a United States marshal and the railroad men to Galesburg and showed them a dynamite cartridge at a point near the track where he had hidden it. As a result of this discovery George Clark, a Brotherhood engineer, was arrested.

A dispatch from Omaha, July 12, states that twelve Brotherhood engineers and firemen applied to the Burlington road there for employment, and were at once engaged. They assigned as a reason for leaving the Brotherhood their belief that Hoge and his accomplices were disgracing the organi-

zation, and they were unwilling to longer remain identified with it.

It is now announced that the expected investigation of the strike by the Inter-state Commission will not be made. Whether the commission ever officially promised to investigate it seems to be doubtful.

The *Railway Review*, which apparently has reliable information, in an editorial last week said:

At last the officers of the Brotherhood have been reached, and the feeling grows that now we shall have this whole disgraceful affair brought out in its true light. There is now a chance to cut deep and to eradicate this cancerous growth in an organization that has been deemed noble and pure blooded. Hoge has been deemed a scoundrel by many Brotherhood men, and when he sent out his infamous circular, and then, in response to the quick inquiries as to its authenticity sent in by its astounded recipients, wrote back that it was genuine, then they knew that they had a second Martin Irons in their ranks, a man who was bringing far greater infamy upon their organization than Irons had upon the Knights. Why they have stood still and let him go on with his selfish schemes, why they did not long since tear the cloak from his wickedness, is a strange and a sad mystery. They permitted him, after they knew his capacity for wrong doing, after they saw that he was deluding his followers into the belief that it was best not to declare the strike off, after they were convinced that he was counseling his men to hold out, for no other purpose than to keep himself in power and in funds, and after they learned of his treachery in keeping a body of them from entering the Santa Fe's service, while he himself was seeking positions there for his friends—they permitted him and his followers, after all this and other knowledge of his true character, to dictate the action of the New York meeting where 2,600 engineers and firemen enthused over the cause and prospects of the Burlington strikers, and agreed to continue contributing to their support. And since then, even since his arrest, we find Chief Arthur and his following in the order non-committal, uncertain as to the course to pursue. Members of the Brotherhood have known all about these things, have known the hollowness of Hoge's public boasts and the selfishness of his private plans; have had the proof of his infamy in planning the destruction of the company's property, but have kept quiet, knowing all along that each fresh move on his part was dragging their order into deeper disrepute.

TECHNICAL.

Locomotive Building.

A new switching engine was completed at the Terre Haute shops of the St. Louis, Vandalia & Terre Haute last week. It is equipped with the American Steam Driver Brake and other improvements.

The Philadelphia & Reading will receive 32 locomotives within the next 60 days, from the Baldwin Locomotive Works, making 60 that have been received since April of this year. The locomotives will be paid for with the proceeds of the new four per cent. bonds. In the plan of reorganization $10,100,000 of these bonds are reserved, to be issued for betterments.

Nearly all the buildings of the Midway Machine Co. in the new quarters in South Anniston, Ala., have now been completed. The brass-foundry room is 50 × 70 ft., and the erecting shop is 50 × 30 ft. The company is building a locomotive for the Hidalgo Railroad of Mexico, for which company they are also rebuilding a number of cars.

Car Notes.

The Ohio Falls Car Co., of Jeffersonville, Ind., has completed 12 new passenger cars for the Chattanooga, Rome & Columbus. The company has built a number of cars recently for new Southern roads, among them one mail and express and two passenger cars for the Georgia Southern & Florida.

The Louisville & Nashville has lately put a number of new refrigerator cars on its line.

The Wells & French Co., of Chicago, is reported to have contracted with the Canadian Pacific for building 500 box cars.

The new sleeping cars being built for the Intercolonial by the James Crossen Car Works, of Coburg, Ont., are so arranged as to be lighted by electricity, and are also fitted with steam heating apparatus. The berths have electric push buttons, and the toilet rooms hot and cold water. The cars also have smoking and drawing rooms.

Six platform and four ore cars were completed at the Louisville & Nashville shops in Birmingham this week.

The Alabama Great Southern has received another consignment of the 100 ore cars the Elliott Car Works, of Gadsden, Ala., are building for the road.

Twelve new passenger cars will soon be built at the St. Louis, Vandalia & Terre Haute shops. The windows will be made larger than is usual, and curtains will be substituted for inside blinds.

Bridge Notes.

Bids are asked until July 25 for the construction of an iron bridge over the Huron River at New Boston, Mich. Address William H. Haywood, Commissioner of Highways.

The bridge of the Brockville, Westport & Sault Ste. Marie across the Rideau Canal at Newboro, Ont., was built by the Dominion Bridge Co., of Montreal, Ont. It is a steel plate girder bridge, with a 70 ft. clear span.

A bridge will be erected at Cochran, Ga., by the County Commissioners. Address A. J. Thomson, of the board.

Four new iron bridges are to be built on the Southwest branch of the Pennsylvania.

Surveys are being made to determine the feasibility of building a bridge over the Carquinez Straits, which it is stated the Southern Pacific contemplates erecting at a cost of $2,000,000.

The following bridges are about to be erected in Toronto, Can., according to the *Engineering and Building Record:* A subway under railway tracks at King street west, 270 ft. long, 66 ft. wide, with centre row of steel columns, superstructure of steel; an overhead bridge over river Don at Gerrard street east, with centre span 122 ft., and 12 approach spans of about 25 ft. each, giving a clear headway over railway tracks of 21 ft., superstructure of steel; an overhead bridge over river Don at Queen street east, with centre pivot span of 150 ft., and 16 approach spans of about 25 ft. each, giving a clear headway over railway tracks of 21 ft., superstructure of steel, with masonry approaches, the viaduct is about 1,040 ft. long; a low-level pivot bridge over river Don at Eastern avenue, all of steel, 150 ft. span; a subway under railway at Carlaw avenue, 66 ft. clear span, 14 ft. clear headway over roadways, superstructure of steel; bridges crossing the railway tracks at the foot of Gorge, York and John streets (with 25-ft. roadway and 8-ft. sidewalks to New street on Esplanade) are to be erected by various railway companies; bridges carrying Dundas street over the railway tracks with 30-ft. roadway and 6-ft. sidewalks."

A survey is being made for a new bridge across the Colorado River, near The Needles, Cal., for the Atlantic & Pacific.

The Kansas City Bridge Co. has been awarded the contract by the Wyandotte County Commissioners for the construction of a bridge over the Kaw River at Kansas City, to cost $65,000.

Manufacturing and Business.

The Richmond & Danville system has adopted W. H. Inloe's turn-table lock as a standard. Eight locks have already been orderd for the Western North Carolina Division.

It is stated that the Richmond & Danville has purchased 600,000 of the National Nut Locks, and will adopt the lock as standard. It is also to be largely used on the Carolina, Knoxville & Western.

The Martin Anti-Fire Car Heater Co., of Dunkurk, N. Y., has lately placed an order with Hill, Clarke & Co., of Boston, Mass., for a complete outfit, consisting of brass finishing lathes, monitor brass lathes, engine lathes, milling machines, upright drills, etc. The Chicago, Burlington & Quincy has also placed an order with the same firm for an outfit for the shops at Plattsmouth, Neb. The firm has also shipped a large iron planer to the Curtis Mfg. Co, of St. Louis, Mo., for the company's new machine shop.

The Kansas City (Mo.) Foundry & Machine Co. is now building a new brick foundry and machine shop at Manchester, a suburb of Kansas City, and expect to be in active operation by Aug. 1. The company has organized with T. B. Ray President, and T. C. Bradley Vice-President and Treasurer. The company has a paid-up capital stock of $40,000.

Manning, Maxwell & Moore, of New York, have recently furnished to the Chicago, St. Paul, Minneapolis & Omaha the following tools made by the Pond Machine Tool Co., of Plainfield, N. J.: One 36 × 36-in. planer, with bed 10 ft. long; one 18-in. and one 28-in. lathe; also one 13-in. Niles Tool Works slotter. The planer was placed in the St. Paul shops of the company, the 18-in. lathe in the Altoona, Wis., shops, and the slotter and 28-in. lathe were sent to the Sioux City shops.

The Roanoke Machine Works will have an electric light plant put in the shops and yard at Roanoke, Va.

The St. Louis Deadlock Brake Co., of East St. Louis, has filed a charter in Illinois, the capital stock to be $25,000. The incorporators are Nathaniel T. Lane, James V. S. Barrett and others.

The Fisher joints have been used on the Brockville, Westport & Sault Ste. Marie.

A company has been organized at Owosso, Mich., with a capital of $1,000,000, to manufacture the Stevens patent car axle oiler. J. W. Begole, of Flint, is President, and Arthur Stevens, secretary.

The Canadian Pacific has let a contract to the New Glasgow Forge Co., of New Glasgow, N. S., to forge 10,000 car axles, the deliveries to extend through a year.

The Laidlaw & Dunn Co., of Cincinnati, has been awarded the contract for furnishing all the pipe, fittings, valves, heaters, pumps, etc., for the Addyston Pipe & Steel Co.'s large new works, now being erected at Addyston, Ohio, a suburb of Cincinnati.

At a recent meeting of the American Live Stock Express Co. the following officers were elected: H. M. Boris, President; Wm. Archer, Vice-President; G. H. Cannon, Treasurer; J. C. Wood, Secretary, and Benjamin F. Holmes, General Manager.

The Jefferson City (Mo.) Water-Works Co. opened the following proposals for furnishing four compound duplex pumps, each to have a daily capacity of 1,250,000 gallons. The Dean Pump Co., Holyoke, Mass., four bids as follows: $6,000, $7,000, $8,000 and $9,000. Gordon & Maxwell Co., Hamilton, Ohio, one proposal each of $6,930, $9,700 and $10,600. Pond Engineering Co., St. Louis, one proposal each of $6,342, $6,667, $6,857, $7,057, $7,217 and $7,742. The contract was awarded to the Pond Engineering Co.

The Rome, Watertown & Ogdensburgh is putting in a large Okonite cable for crossing the Genesee River at Charlotte, N. Y., for the Thomson-Houston system of electric lighting, which the road is largely using.

At the annual meeting of the Swinerton Locomotive Driving Wheel Co., held in Portland, Me., recently, the following officers were elected: President, Charles E. Swinerton, Boston; Secretary and Treasurer, J. Hopkins Smith, New York.

The battery jars and pipe conduit which the Union Indurated Fibre Co. placed in the Jersey City Station of the Pennsylvania, are giving entire satisfaction. After a thorough test of the battery jars the material on examination was found to be as dry and good as before the solution was placed in it. The battery boxes are also used by the New York, Lake Erie & Western, and Boston & Albany. The company has recently received orders from the Electrical Accumulator Co., Julien Co., and from the Bell Telephone Co., for use in Philadelphia.

The Ajax Lead Co. has been organized in Philadelphia with the following officers: President, J. G. Hendrickson; Vice-President, W. W. Gibbs; Secretary and Treasurer, William Curtis. The capital stock is $1,000,000. The company has patented a process for covering iron with pure lead, to be used for wire fencing, iron bridges, roofing, telegraph wire, piping, screws, nuts, bolts, etc.

The 26 locomotives which the Dickson Manufacturing Co., of Scranton, Pa., is building for the Central of Georgia will be equipped with the May reverse lever latch.

The Curtis Regulator Co. has recently shipped two damper regulators to England, and 18 steam traps and six pressure regulators to Denmark; also a 200 h. p. damper regulator to the Coogaree Manufacturing Co., of Columbia, S. C. Besides these the company has received orders from New York for a 4-in. steam separator, and from Boston for 144 steam and water regulators of from 1 to 6 in.

A stock company with $100,000 capital has been organized in Denver, Col., to develop the Moffatt anti-friction journal box. The weight of the car is taken on roller bearings and the side thrust by ball bearings.

Iron and Steel.

The Paige Iron-Works has been organized in Illinois, with a capital of $25,000, to manufacture iron, steel and other metals. The incorporators are John Crerar, Edward S. Shepherd and Alonzo W. Paige.

The Allegheny Bessemer Steel Co. is placing a steel rail machine in its works at Duquesne, Pa., to make three rails at once, and is otherwise enlarging its plant. The works, when completed, will, it is said, be larger than any other in the country, excepting those of Carnegie.

The firm of Hussey, Howe & Co., Limited, steel manufacturers at Pittsburgh, Pa., will shortly be dissolved, and an incorporated organization effected.

The Lukens Rolling Mills, Coatesville, Pa., have just put in a new set of three-high rolls, 98 by 30, in place of 84 by 25, as heretofore. A new cylinder of increased size has also been put in, with Corliss valve gear to their engine.

The contract has been let for building the machine shop and foundry for Flynn & Emerich, of Baltimore, Md. The building will be five stories, and 58 by 125 ft.

The Junction Iron Co., at Mingo, Ohio, will build a new furnace, with a capacity of from 150 to 175 tons a day.

The puddling department of the works of the Keystone Iron Co., at Pittsburg, Pa., were destroyed by fire last week, caused by an explosion of natural gas. The loss, it is thought, will reach nearly $100,000.

J. M. Stark, of Pawnee, Ill., wishes to purchase a light locomotive and 4½ miles of 50 lb. steel rails, with splices, etc.

The Conference Committee of the Western Iron Association has been dissolved and the members absolved of all pledges made in regard to the wage question, and many members of the Association have signed the Amalgamated scale.

The Rail Market.

Steel Rails.—The report of the Board of Control for July 1 shows that 934,987 tons out of an allotment of 1,205,000 have been sold up to date. Of this, 585,558 tons have been delivered. The sales last year for the same period were 1,695,055 tons, shipments being 907,351 tons. Lots aggregating 9,000 tons have been placed during the week in the East at private terms. Quotations continue at $30 for moderate lots at Eastern mills.

Old Rails.—No important sales are reported.

Track Fastenings.—Quotations: Spikes, 2@2.05c. delivered; angle bars, 1.85@1.9c. delivered.

THE SCRAP HEAP.

Leaving the Flyer Behind.

A special fruit train on the Union Pacific has, according to the Omaha *Republican*, been run from Ogden to Omaha, 1,031 miles, in 32 hours, beating the record and covering the distance in 8 hours less than the east-bound flyer takes. At Cheyenne "the train went out of the depot so quick that it almost pulled the town around, and made everybody in it dizzy;" and at Omaha it arrived neck and neck with a street car which started from the north end of the city at the time the fruit train was leaving Grand Island; at least, so says the *Republican*.

Speed Indicators.

An exchange states that the railway department in Switzerland has issued an order compelling all engines traveling more than 28 miles per hour, to use a speed indicator, which must mark correctly the variations of speed. A good market is open to whoever can furnish the best article.

No Railroad for Tombstone.

The Tombstone *Prospector* abandons the struggle for a railroad with these words: "The *Prospector* is glad the railroad campaign is over. In the heat of the conflict we may have said harsh things against the city and county governments, for not taking steps to bring the road this way, and also used expressions against individuals who did not agree with us on the proposition. We take this opportunity to take it all back. We don't want a railroad and never did. Bull butter and jerked beef is good enough for us. Vive la capital."

English Railroads.

For the first 26 weeks of this year the railroads of the United Kingdom report gross receipts of £32,516,682, a net increase of £468,000. All of this increase is on freight, the passenger service showing a decrease of about £121,000. This increase of railway income in connection with the improvement in general trade, as shown by the Board of Trades' monthly returns, gives hopes for a healthy and solid improvement. *Herapath's* commenting on the brighter outlook says: "Our manufacturers are learning to do business on modern principles, are pushing afield in foreign countries, are paying greater attention to design, finish, and competition here at home," but adds, "The railway bill, it is true, is hanging like the sword of Damocles, but these instruments have sometimes two edges and cut both ways."

An Echo from the Conventions.

The "Executive Committee" of that unorganized and unnamed body which may be called the Business Annex of the Master Car-Builders' and Master Mechanics' Conventions, has made a statement of receipts and expenditures for the entertainment of both conventions. It will interest a good many of our readers to know how much was so spent, and what it was spent for, and there seems to be no good reason why they should not know it. The Executive Committee sets a good example in the care with which it accounts for the money; and the statement suggests ingenuity as well as discretion in the entertainment provided. The expenditure of $180 for flowers and not a cent for wine shows what kind of an opinion the committee had of its guests.

EXPENDITURES.

Transportation of band from Utica to Alex. Bay and return	$77.75
Charter of steamer "Islander" for moonlight sail	73.00
Hugh Graham, for 200 corsage bouquets	75.00
Charter of 34 fishing boats	131.85
J. F. J. Xiques, for 400 "Regalia Britannic" cigars and expressage	48 65
Hugh Graham, for 200 corsage bouquets	100.00
Miss Corinne Flint	35.00
Fiers-tine & Gifford, 300 badges and pins	25.68
Telegraphing	2.72
Prize money for scull race	20.00
Charles Slate, for scow and lumber, picnic tables	2.45
1,000 Islands Steamboat Co., lunches on Kingston excursion	86.00
Cornwall Brothers, 100 imported cigars	10.50
Telegrams and one fare from Clayton	3.15
Carriage hire at Kingston (26 carriages, two hours each)	52.00
E. C. Estes, for flowers	5.00
J. C. Payne, printing 100 circulars	3.50
Cornwall Brothers, 3 boxes imported cigars	16.00
" " for poles and flags for scull race	7.14
St. Lawrence Hotel, board for band 11 days	295.50
Rose Publishing Co., badges, ribbons, letter heads, etc.	7.25
1,000 Islands Steamboat Co., Steamer "St Lawrence," Kingston excursion	75.00
Geo. B. Jacobs, bandmaster, for band	581.07
Telegrams, greased pole prize money, etc	28.85
R. H. Southgate, dinners on Wells Island for guests from other hotels, boatmen's services, lumber, rent of hammocks, etc	466.95
Materials for decorating the rink	21.87
Prize money, second greased pole walk	13.50
Prize money for tub race	10.00
Charter of fishing boats for three days	389.25
Expressage on money	.75
Printing statement, proposition form, postage, etc	22.25
Committeemen's incidentals	15.45
Telegraphic bulletins, Chicago convention	15 88
Total expenditures	$2,818.96
Balance on hand	$506.04
Total receipts from 133 subscribers, at $25 each	3,325.00

The New Texas Iron Field.

As long ago as before the war Texans knew that there were large deposits of very pure brown hematite ore in Cherokee County, southeast of Rusk, now on the St. Louis, Arkansas & Texas Railroad. It had been worked in a small way in a Catalan forge, and it was proposed to build a charcoal furnace there during the war to supply shot, etc., to the Confederate armies. Whether any work of value was done at this time or not, the deposit remained undeveloped until 1883, when the state of Texas built a 30-ton charcoal furnace, which has since been turning out very good iron, a portion of which has been sold as pig; $100,000 worth has gone into the new Texas capitol, and some has been run directly from the blast furnace into gas and water pipes.

Mr. A. B. Blevins, a civil engineer, for some ten years a

resident of Texas, has formed a company of St. Louis and New York capitalists, with a capital of $1,000,000, which has purchased 20,000 acres of ore bearing and timber land, intending to make charcoal iron. Mr. John Birkinbine estimates from the experience of the State furnace that their pig-iron will cost them $12.96 per ton. There is a distance of 500 miles from the nearest charcoal furnace and 600 miles from the nearest coke furnace, and Rusk is about 200 miles from the coal mines of Indian Territory and those of Arkansas. It is estimated that there are 50,000,000 tons of 40 to 45 per cent. ore. So the prospect is good, not only for a local market for the pig iron and the manufactured articles that depend on that commodity, but for another centre of cheap iron.

The town is to be called New Birmingham. It is a pity that there are no names connected with the history of Texas that can be honored by association with this new enterprise, or no local or Indian word applicable.

A Cheap Process of Obtaining Aluminium.

A daily paper states that a new and cheap process of obtaining metallic aluminium has been put into successful operation at Newport, Ky. This method is based upon the theory of substitution and smelting the ore in a water-jacketed steel furnace, a crucible being useless to resist the strong fluoride fluxes. When the mass is quite liquid it is conveyed into a converter, or covered slag-pot, holding about 400 lbs., and the aluminium extracted therefrom by a siphon tap. The slag is returned to the furnace, serving the purpose of a flux with more ore. It is stated that this direct continuous process obviates, the necessity of the usual costly intermediary element and that the aluminium can be obtained as cheaply as copper.

"Tippecanoe and Tyler Too."

The Locomotive Engineers' *Journal* in an account of the golden wedding of Mr. Porter King, the veteran engineer on the Boston & Albany, gives some reminiscences which did not appear in the account we copied a few weeks ago. The *Journal* says: "In 1835, three years previous to his marriage, Brother King drove horses on the New York Central, drawing cars from Albany to the foot of the inclined plane. Prior to September 1st, 1839, he was employed 19 months in drawing cars with horses from Jersey City to Bergen tunnel, and after the tunnel was completed and the company began to use engines, he still drove his horses by night, drawing cars from Jersey City to Newark. September 1st, 1839, he commenced firing on the road owned by the New Jersey Railroad & Transportation Co., and was employed on that road three years as fireman and engineer. He ran an engine there at the time of the William Henry Harrison—"Tippecanoe and Tyler too"—Presidential campaign, and tells stories of the excursion trains that were run to the political rallies in the different towns along the line of the road; of the log cabins built on flat cars, and decorated with coon skins and filled with barrels of cider to assuage the thirst of the crowd."

A gold-headed cane from the Brotherhood was among the presents at the recent celebration. What use such an ornament can be to a lively locomotive runner, except on Sundays, is not apparent, though the editor of the *Locomotive Engineer* could no doubt suggest a plan for modifying it into a flue cleaner or a pinch bar.

Train Collectors.

The Ohio & Mississippi has decided to put on train collectors, and has, it is stated, engaged for a portion of its trains four clerks from the auditing department of the Cincinnati, Washington & Baltimore.

The Cincinnati Centennial.

The great Centennial Exposition of the Ohio Valley, now being held at Cincinnati, opened July 4. The various exhibits are now about all in position, and there is said to be a fine show of machinery.

Stealing a Locomotive.

A Burlington locomotive was stolen from the yards in Denver on the night of July 4 by five masked men, who ran it to Derby, a small station sixteen miles out. The apparent object was to wreck an incoming passenger train. Joseph Hamm was standing in the yards with his engine, having just completed making up trains. Without warning, he was apprehended by the five men, who ordered him down out of the cab, and then hastily climbed in. The switch having been previously changed, they pulled the throttle and started out upon the main line. Although there were four Burlington men in the yard no attempt was made to stop the marauders. They put on steam and started from the city at a furious rate. When the trainmen realized what was being done and the consequences that would follow if the engine was not recaptured, they manned a rescuing train. The Burlington men having the advantage of speed, kept gaining upon the runaway. The race consumed about three-quarters of an hour, and at the expiration of that time the rescuing party overhauled the locomotive at Derby. The marauders damaged the engine and left it without lights.

A Bicycle Track.

Special roads for various purposes, including the transport of ships, have been much developed of late, but a road or path specially devoted to bicycles is a novelty. It is proposed to build a cinder path from New York to New Haven, for the benefit of bicycle riders. It is to be 3 ft. in width, and laid at the side of the present road where the existing roads are not good. The path will be about 70 miles in length, and the average cost of building is estimated at $75 per mile, or a total of $5,250, and part of the amount has already been subscribed.

Houses for Mexico.

Quoting a report by the British Consul at Vera Cruz, the *Mexican Financier* says that wooden houses with all parts so constructed that they can easily be transported to the selected site and then set up would be among the most profitable articles of import to that city. Iron houses are too hot, and the wooden houses sent out should have spacious porticos, overhanging eaves, and roof high enough at the ridge to give adequate ventilation. The great difficulty with these houses is with the roof, as an iron roof is too hot, and unprotected wood is liable to shrink and crack. Consul Baker suggests that the thatch of the country would make a good roof, and that the houses sent out should be arranged for that.

Too Sanguine.

We have all been at the hotel when the races were on or the Cough Drop Brokers' Mutual Aid and Recognition Society were holding a convention. The three strangers in one bedroom are, of course, inevitable, and, as the poet sings in the well-known lines:

"One snored and the others were left!"

In this particular case, the tearing of carpets had been duly succeeded by the deathbed of the hog, which had in turn given place to the very knotty timber and the dull buzz saw, which naturally had been superseded by the bad suffocation scene, when suddenly all was still.

One of the anxious watchers by the bedside was overcome by his overwrought feelings, and exclaimed: "Thank God, he is dead." We can all sympathize with the two survivors.

Strikes.

A dispatch from Des Moines, Ia., July 14, reports that eleven Wabash switchmen had struck there, on account of the removal of Yardmaster Floyd and the substitution of a non-union man.

The switchmen's strike on the Burlington at Kansas City ended in failure. The road secured new men and nearly all the Hannibal strikers are seeking new positions. The Kansas City, St. Joseph & Council Bluffs men were "waiting to be taken back at last accounts. The business of the road is progressing as usual, and the attempt to institute a boycott was a farce."

A Subject for the Roadmasters' Association.

Frogs in various states of activity have often made trouble for trains, but the delays occasioned by "toads on the track" have generally been supposed to be mythical. Not so, however, at Beaver Falls, Pa. A report from that place says: "Myriads of toads have appeared on the east side of the town. They are about the size of a grain of coffee, and as lively as crickets. Monday morning they covered the track of the Pittsburgh & Lake Erie Railroad several inches thick(!) and a passenger train slid past the station before it could be brought to a standstill, owing to the rails being made slippery by the crushed bodies of the little reptiles. The track had to be cleaned and sanded before the train could start again."

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

The Supreme Court of Texas decides that under the statute of that state, requiring a railroad company to deliver up the possession of goods to the owner or consignee upon payment of the freight charges as shown by the bill of lading, and prescribing a penalty for a refusal so to do, a railroad company has no right to impose as a condition the surrender of the bill of lading, where the goods have been hauled over connecting roads, and the freight charges as shown by the way-bill are greater than those in the bill of lading, any custom to the contrary notwithstanding.[1]

In the same state, the Supreme Court holds that in an action for damages to cattle in shipping, on the ground of unreasonable delay and improper operation of the train, evidence that the cattle were shipped on a way train, which necessitated many stops, is admissible, although defendant made no contract not to ship on such train, nor to transport at a given rate of speed; and evidence of rough handling of the train, and that injury resulted from the jerking in stopping and starting so often, is competent, as tending to show carelessness.[2]

In Arkansas the Supreme Court decides that where a railroad freight contract, limiting the company's responsibility to that of a private carrier for hire, is signed by the parties in duplicate, and one copy thereof kept by the consignor, the fact that he signed it under a mistake as to its contents, not having read or heard it read, does not, in the absence of fraud or imposition by the company in procuring his signature thereto, relieve him from the effects of the contract after it has been acted upon by both parties. A clause in a bill of lading of live stock which limits the carrier's liability to the sum of $50 for each animal lost, when based upon reduced charges for their transportation is reasonable, and will be made the measure of damages, although the animal killed was worth from $600 to $800.[3]

In Tennessee the receipt for a lost package contained a clause making the presentation of a written claim for any loss within thirty days from date of receipt a condition precedent to recovery therefor. There was evidence tending to excuse plaintiffs for their delay in making such claim, which was made as soon after discovery of the shortage as was reasonably possible. The Supreme Court rules that a strict compliance with the terms of the receipt was not necessary.[4]

In Alabama the Supreme Court decides that where a bill of lading contains a stipulation fixing the carrier's liability in case of total loss of the goods, such limitation being in consideration of a reduced rate of transportation, the higher rate being reasonable, and there being no imposition or undue advantage, such stipulation will be upheld, although the goods may have been destroyed in an accident caused by the carelessness of the carrier's servants.[5]

In Iowa the Supreme Court holds that when a railroad track on plaintiff's land was carried over trestle-work which was not fenced in, and under which plaintiff used to cross the road, but had acquired no right to do so, he is not entitled to damages for being deprived of the passage; but, if the company close it up, they must provide another crossing.[6]

Injuries to Passengers, Employes and Strangers.

In New York a passenger was riding in a car with the window open and his arm resting on the sill. A loose door of a passing freight car struck his arm and injured it. The Court of Appeals affirms a verdict in his favor.[7]

In the same state a passenger alighting from an open car on the Coney Island Railroad caught her clothing in a broken hook and was thrown to the ground and injured. The railroad showed that all the Coney Island cars were furnished with the same kind of curtains and hooks, and that there was no better way known of fastening the curtains; that its road had been operated for several years, and carried more than a million passengers every year, and that such an accident had never before occurred; that the springs in the hooks would sometimes break by use; that at the end of every trip the cars were inspected by persons assigned to that duty, and the curtains examined; and if a broken hook was discovered it was taken off and replaced by a perfect one. The Court of Appeals rules that the railroad is not responsible.[8]

In Maryland it is held not negligence to attempt to board a train at a place other than a station, especially when directed to do so by a servant of the railroad.[9]

In Texas the Supreme Court rules that it is negligence in a railroad company, when reaching a place at which passengers are to leave its train, to put the train in motion again before passengers had sufficient and reasonable time to alight. But having waited a reasonable time it is not negligence to start without ringing a bell or giving a signal.[10]

In Michigan there was a gravel walk from the depot to the street, and near it a mud hole nearly 3 ft. deep. A passenger going along the path at night stepped into the hole and was hurt. The railroad is held responsible.[11]

In Missouri the Supreme Court rules that it is the duty of a railroad company to inspect foreign cars received for transportation upon its road, with reference to their safety, just as it is bound to inspect its own.[12]

In Indiana, the Supreme Court in laying down the duty of a railroad in selecting its employés says: "In employing its subordinates it was the duty of the company to exercise a degree of care commensurate with the responsibilities of the position in which they are to be placed, and with the consequences which might ensue from incompetence or unskillfulness on the part of those employed. In case peculiar fitness was required, or special qualifications demanded for the service to be performed, unless it was assured, by the previous like service of the conductor, of his fitness, the duty of the company required it to institute affirmative inquiries in order to ascertain his qualification in that regard."[13]

In the same state, while a section foreman on a railroad was returning from his work on a hand car, his foot was caught by a broken tie, which had bulged or sprung up in the middle of the road, and he was thrown from the car, and injured. It appeared that he had a short time previously, in discharge of his duty to the company, reported the bad condition of his section of the road (but did not do through any fear of injury or accident to himself in the course of his employment), and had demanded materials for necessary repairs, which were promised, but never furnished. Relying on the promise he continued in the employ. The Supreme Court holds that he is entitled to recover damages.[14]

The Supreme Court of Mississippi holds that a brakeman on one train and the employés operating another train on the same road are "fellow-servants."[15]

In Washington Territory, where a switching engine struck the plaintiff as he was driving across the track on the only road leading from one part of a town to the other, the evidence showed that so far as he could see the train, his view of it being partly obstructed by other cars, he saw it moving away from the crossing; that the engine bell was not ringing continuously; that this switching train was passing back and forth over this crossing almost continuously; and that after coming within 15 feet of the track he could not have stopped his team with safety. The Supreme Court rules that there was no negligence on his part and he may recover damages.[16]

In Missouri, in an action for killing a child, the defense was that the engine which killed the child was not being used in the defendant's business or with its knowledge or consent. The evidence showed that it was being run by certain of defendant's men, to take them home to supper; that it had been so used for upward of three months in an open and notorious manner, with the knowledge of the yard-master; that the superintendent had seen it so used, and was in a position to know all about it. The Supreme Court decides that this was sufficient to bind the defendant and it is liable in damages.[17]

In Texas the Supreme Court lays it down that a railroad is not liable for the death of one killed by its cars, while walking or standing on its track, where the person killed is guilty of negligence in going on the track, and nothing has supervened from the time he went on the track until the time of the accident to relieve the original act of its culpability, unless the company's servants actually saw him on the track, and failed to use reasonable diligence to prevent the train from running over him.[18]

In Kentucky it appeared that the plaintiff was run over when on the track at a crossing in a large city, such crossing, to the knowledge of defendant, being generally used by the inhabitants: that those in charge of the train could have saved plaintiff by the use of ordinary care, either by checking the train or by warning him of his danger by whistle. The Court of Appeals affirms a verdict in the plaintiff's favor.[19]

[1] Dwyer v. G., C. & S. F. R. Co., 7 S. W. Rep., 504.
[2] G., C. & S. F. R. Co. v. Ellison, 7 S. W. Rep., 785.
[3] St. L., I. M. & S. R. Co. v. Weakly, 8 S. W. Rep., 134.
[4] Glenn v. South Ex. Co., 8 S. W. Rep., 152.
[5] L. & N. R. Co. v. Sherrod, 4 South. Rep., 29.
[6] Bell v. C., B. & Q. R. Co., 37 N. W. Rep., 769.
[7] Breen v. N. Y. Cent. & H. R. R. Co., 11 Cent. Rep., 891.
[8] Keely v. N. Y. & S. B. R. Co., 11 Cent. Rep., 874.
[9] B. & O. R. Co. v. Kane, 12 Cent. Rep., 95.
[10] G., C. & S. F. R. Co. v. Williams, 8 S. W. Rep., 79.
[11] Cross v. L. S. & M. S. R. Co., 14 West Rep., 181.
[12] Gutridge v. Mo. Pac. R. Co., 7 S. W. Rep., 476.
[13] E. & T. H. R. Co. v. Guyton, 14 West. Rep., 391.
[14] G., C. & S. F. R. Co. v. Donnelly, 8 S. W. Rep., 52.
[15] McMaster v. Ill. Cent. R. Co., 4 South Rep., 59.
[16] North. Pac. R. Co. v. Holmes, 18 Pac. Rep., 76.
[17] Reilly v. H. & St. Joe R. Co., 7 S. W. Rep., 407.
[18] G., H. & S. A. R. Co. v. Ryon, 7 S. W. Rep., 687.
[19] L. & N. R. Co. v. Schuster, 7 S. W. Rep., 874.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Mill Creek & Mine Hill Navigation & Railroad Co., 5 per cent., payable July 13.

Mount Carbon & Port Carbon, 6 per cent., payable July 13.

St. Louis & San Francisco, semi-annual, 3½ per cent. on first preferred stock, payable Aug. 10, to stockholders of record July 23.

Terre Haute & Indianapolis, semi-annual dividend, 3 per cent., payable Aug. 1, to stockholders of record July 14.

Wheeling & Lake Erie, 1 per cent. upon preferred stock, payable July 25, to stockholders of record July 21.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlanta & West Point, annual meeting, Atlanta, Ga., Aug. 5.

Boston, Hoosac Tunnel & Western, annual meeting, Saratoga Springs, N. Y., Aug. 15.

Duluth, South Shore & Atlantic, annual meeting, Marquette, Mich., July 19.

Evansville & Terre Haute, special meeting, Evansville, Ind., July 21.

Marquette, Houghton & Ontonagon, annual meeting, Marquette, Mich., July 19.

Rutland, annual meeting, Rutland, Vt., July 26.

Troy, Saratoga & Northern, annual meeting, Saratoga Springs, N. Y., Aug. 15.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Railroad Accounting Officers will meet at the Hotel Brunswick, New York City, July 25, to organize a permanent association.

The *National Association of General Baggage Agents* will hold its next meeting in New York City July 18.

The *Roadmasters' Association of America* will hold its next convention at Washington, D. C., Sept. 11.

The *New England Roadmasters' Association* will hold its sixth annual convention at Boston, Mass., Aug. 15-16.

The *National Association of General Passenger and Ticket Agents* will hold its fall meeting in Saratoga, N. Y., Sept. 18.

The *American Association of Railway Chemists* will hold its next meeting in Baltimore, Md., in October.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The *Western Railway Club* will hold its next meeting on the third Wednesday in September, at the Grand Pacific Hotel in Chicago.

The *Central Railway Club* meets at the Tifft House

Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, N. Y.

The *Boston Society of Civil Engineers* holds its next regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of September.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *Engineers' Club of Philadelphia* will hold its next meeting in Philadelphia, Oct. 6.

The Engineers' Society of Western Pennsylvania will hold its next meeting in Pittsburgh, Sept. 18.

The Engineer's Club of Kansas City will hold its next regular meeting Sept. 3.

American Association for the Advancement of Science.

The thirty-seventh meeting of the Society will be held in Cleveland, O., Aug. 15 to 21, instead of Aug. 22 to 28, as previously announced. The hotel headquarters will be at the Hollenden, and the meetings will be held at the Central High School Building, on Wilson avenue.

General Baggage Agents' Association.

The semi-annual meeting of the National Association of General Baggage Agents was held in the Murray Hill Hotel, in New York, commencing July 18. J. W. Naylor (New York, Ontario & Western), H. W. Souders (Philadelphia & Reading), and W. H. MacDonald (Castle Garden) were elected members. There was a discussion as to the transportation of dead bodies, and a committee was appointed to report on Thursday. The new check and tariff adopted since the annual meeting in January for excess baggage were discussed Thursday.

Claim Agents' Association.

The annual fall meeting of the Claim Agents' Association of the Eastern, Middle and Southern states will be held at the International Hotel, Niagara Falls, N. Y., on Thursday, Aug. 2.

PERSONAL.

—Charles B. Jacobson has been appointed City Engineer of Roanoke, Va. He was formerly with the Norfolk & Western.

—Col. John W. Dunn, President of the Atlanta & Florida, and a prominent citizen of Atlanta, Ga., died in that city July 16.

—Mr. George W. Curtis, General Passenger and Freight Agent of the Louisville, Evansville & St. Louis, has tendered his resignation, to take effect July 31.

—Andrew Broaddus has resigned the position of General Freight Agent of the Louisville, Cincinnati & Lexington Division of the Louisville & Nashville.

—George T. Earhart, who has been ticket agent of the Cincinnati, Hamilton & Dayton, at Hamilton, O., for 36 years, has tendered his resignation, and will retire to private life. Mr. Earhart's father was Chief Engineer of the road during its construction and many years after.

—Capt. T. S. Newcomb, Division Engineer of the Kansas City, Memphis & Birmingham, has resigned to accept a position as Division Engineer of the Louisville, St. Louis & Texas, with headquarters at Spottsville, Ky., and will have charge of the erection of the iron bridge at that point. He surveyed part of the Kansas City, Memphis & Birmingham, and has since been connected with that line.

—Col. O. N. Lull, who was Superintendent of the Cumberland Valley Railroad from 1850 to 1873, died at his home in Chambersburg, Pa., July 15, at the age of 60 years, from heart affection. He was master mechanic of the road for many years, and held several other important positions. He was an experienced railroad man, and well known throughout the eastern cities.

—Col. B. W. Frobel died in Monticello, Ga., July 12, after an illness of a month. He was born at Alexandria, Va., in 1830, and graduated at West Point. He entered the Confederate States Navy at the beginning of the war, was transferred to the Army of Virginia and made Lieutenant-Colonel of Engineers, serving in the engineer and artillery corps during the war, and soon after its close was appointed engineer for the Northern District of Georgia. He devised a plan for securing pure water to Atlanta, by diverting the waters of the Chattahoochie River to the city. The recommendation for an appropriation was defeated in Congress Soon after this he was appointed Chief Engineer of the Covington & Macon, and at the time of his death was Vice-President and General Manager. He leaves a wife and two daughters.

—Hiram Sibley, the well-known philanthropist, died at his home in Rochester, N. Y., after an illness of some months, at the age of 81 years. He was born at North Adams, Mass., and in early life was a maker of machinery, but became interested in telegraphs. He early saw the necessity of consolidating the numerous weak companies into a strong organization and was a prime mover in the founding of the Western Union, which included a score or more of local lines. He also took an active part in the establishing of the first line to the Pacific Coast. He was President of the Western Union Telegraph Co. for many years, resigning in 1869, on account of ill health. In these and other ventures he accumulated a large fortune. He gave great gifts in several directions, including $100,000 for the teaching of the mechanical arts in Cornell University, and $100,000 for a fire-proof library building at the University of Rochester.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—W. A. Drake has been appointed Assistant Engineer of the Western Division, with office at Pueblo, Col. A. P. Hall has been appointed Assistant Superintendent of the Western Division in charge of train and station service, with headquarters at Pueblo. W. W. Allen has been appointed Superintendent of Coal Properties, with office at Topeka. His territory embraces Colorado and Kansas.

Herbert Hackney, Assistant Superintendent of Motive Power, will have charge of the mechanical department of the Southern Kansas, now consolidated with this company.

Chicago, Burlington & Quincy.—J. H. Palmer has been appointed Southern Freight and Passenger Agent, with headquarters in New Orleans.

Columbia, Newberry & Laurens.—The following officers have been elected: H. C. Moseley, President, Prosperity, S. C.; R. S. Desportes, Vice-President, Columbia, S. C.; C. J. Iredell, Secretary and Treasurer, Columbia; M. A. Carlisle, Attorney, Newberry: Chas. Ellis, Jr., Chief Engineer, Columbia.

Cairo & Cape Girardeau.—The following officers have been elected: President, Charles O. Patier, Cairo, Ill.; Treasurer, Henry Wells, Cairo.

Cincinnati & Green River.—George B. Harper has been appointed Receiver, with office at Yosemite, Ky.

Cumberland Valley & Martinsburg.—The following directors were elected at a meeting of the stockholders last week: Thomas B. Kennedy, John Steward, Colonel J. F. Boyd, Chauncey Ives and A. L. Langdon, of Chambersburg, and Holmes Conrad, James B. Russell, R. W. Stone and German Smith, of Winchester. T. B. Kennedy, President of the Cumberland Valley, was elected President. Construction will soon begin on the extension to Winchester.

Florida Central & Peninsula.—The new board of directors have elected H. R. Duval President, and J. Hansom Thomas Treasurer.

Fort Worth & Denver City.—L. H. Clawson has been appointed Trainmaster of the Third Division, from Clarendon, Tex., to Clayton, N. M., to succeed M. T. Thomas, resigned.

Garden City Nickel Plate.—J. S. Painter, President; Z. T. Nelson, Vice-President; A. H. Adkinson, Secretary. The general office is at Garden City, Kan.

Grand Trunk.—A. H. Smith, formerly Assistant Mechanical Superintendent, has been appointed to take charge of the mechanical departments of the southwestern and northern divisions, with headquarters at Toronto. P. Clarke, formerly Mechanical Superintendent of the Northern Railway, will have charge of the mechanical department of the Grand Trunk between Toronto and Kingston, with office at Toronto.

Hawkinsville, Americus & Eastman.—The company has organized with the following directors: R. J. Taylor, R. G. Lewis, R. V. Bowen, J. D. Stetson and J. O. Jelks.

International & Great Northern—J. R. Burnett has been appointed Attorney, with office in Palestine, Tex., to succeed J. Y. Gooch, resigned.

Little Rock & Memphis.—Robert K. Dow, Watson Matthews and Charles Moran, Trustees of the Memphis & Little Rock Railroad Co., have turned over the road to the Little Rock & Memphis Railroad Co. The officers of the reorganized company are as follows: Rudolph Fink, President and General Manager; J. W. Goodwin, Secretary and Treasurer, Little Rock, Ark.; F. E. Hastings, Auditor and Land Agent; S. W. Tucker, General Freight and Ticket Agent; S. Gordon Jones, Superintendent, with office at Memphis, Tenn.

Lockport & Buffalo.—At the annual meeting in Lockport, N. Y., last week, the following directors were elected: Thomas T. Flagler, Levi F. Bowen, James Jackson, Jr., J. Carl Jackson, Alonzo Mansfield, John Hodge, William Richmond, William Spalding, Isaac Merritt, John T. Darrison, James S. Tiddle, Washington H. Ransom and Ambrose S. Beverly. Officers were elected as follows: President, T. Flagler; Vice-President, William Spalding; Secretary, W. H. Ransom; Treasurer, John Hodges.

Maquoketa, Hurstville & Dubuque.—The incorporators of this Iowa company are: A. Hurst, Jas. Burns, J. K. Bowman, Z. De Groat, C. M. Sanborn, A. L. Bartholomew, Jno. L. Sloane, F. Gurius. The following officers have been elected: President, C. M. Sanborn; Vice-President, James Burns; Treasurer, Z. De Groat; General Manager, A. Hurst; Secretary, Jno. L. Sloane; General Solicitor, A. L. Bartholomew. The principal office is to be in Maquoketa, Ia.

Maysville & Big Sandy.—The following officers will operate the road: H. E. Huntington, Superintendent Construction; G. Honshell, General Agent; J. G. Rawn, Master of Transportation; L. B. Lewis, Jr., Auditor.

H. S. King has been appointed Train Dispatcher, with headquarters at Maysville, Ky.

Mobile, Jackson & Kansas City.—The company, formed by the consolidation of the Mobile, Hattiesburg & Jackson, in Alabama and Mississippi, has elected the following directors: R. L. Saunders, C. W. Robertson, M. Green, P. W. Peeples, B. Semly, S. S. Carter, John Kamper, R. Dane, Adam Glass, O. F. Cawthorne, W. H. McIntosh and H. A. Austill.

New York Central & Hudson River.—W. K. Gillett has been appointed Auditor of Passenger Receipts, to succeed C. H. Kendrick. J. H. Fairlamb has been appointed Assistant Auditor, to succeed Mr. Gillett.

New York, Mahoning & Western.—The following are announced as directors of the Allegheny Construction Co.: J. Sharp McDonald, of Pittsburgh: A. Brown, Secretary and Treasurer, of Allegheny City; T. S. Freeland, A. Genin and A. W. McDonald, of Allegheny City.

Norfolk & Western.—It has been decided to establish five divisions on the road, instead of a Western and an Eastern division as heretofore. The divisions are as follows: Eastern, Lynchburg, Western, Radford and Flat Lop, the latter including the coal branches.

Oregon Railway & Navigation.—At a meeting of the new directors, held in Portland, Ore., lately, the following officers were elected: President, Elijah Smith; Secretary, S. B. Willey; Treasurer and Assistant Secretary, P. W. Smith; Assistant Treasurer, C. F. Holcomb.

Richmond & Seven Pines.—A. G. Babcock has been elected President of this Virginia company, and O. B. Murphy Secretary and Treasurer.

St. Albans & Coal River.—The following are incorporators of this West Virginia company: William M. Peyton and Peter Fontaine, of Charleston, W. Va., and Samuel W. Jordan and John S. Cunningham, of St. Albans.

St. John & Eastern.—The annual meeting was held last week and the following directors were elected: Dr. De Bertram, E. McLeod, Q. C.; A. A. Stockton, M. P. P.; Charles D. Jones and Hon. William Pugsley.

Southeastern.—The following directors were elected at the annual meeting in Montreal, July 18: Sir George Stephenson, Sir Donald A. Smyth, Richard B. Angus, J. Furber, T. G. Shaughnessy, T. A. MacKinnon, Charles Drinkwater, A. B. Chaffee and the Hon. B. B. Smalley.

Tennessee Coal, Iron & Railroad Co.—W. H. Griswold has been appointed Superintendent of Track, with office in Pratt Mines, Ala.

Texas & Pacific.—W. D. Minton has been appointed Master Car-Builder, with headquarters at Marshall, Tex., to fill the vacancy occasioned by the resignation of C. H. Mead.

Texas, Santa Fe & Northern.—E. Lewis, General Passenger and Freight Agent, has been appointed Superintendent, with office in Santa Fe, N. M., to succeed E. Dougherty, resigned.

OLD AND NEW ROADS.

New Companies Organized.—Maquoketa, Hurstville & Dubuque.—Mobile, Jackson & Kansas City.—Pittsburg, Canonsburg & State Line.—St. Albans & Coal River.

Atlantic, Tennessee & Western.—The surveys for this road between Elizabeth, Tenn., and Carter's Furnace are being made by W. A. Kite.

Birmingham Mineral.—The contract for grading and tracklaying an extension from Village Springs, north to Chepultepec, Ala., a distance of 19 miles, has been let to J. W. Worthington & Co., of Birmingham, Ala., and a force of 100 men has commenced clearing the road at Village Springs, and grading will probably commence next week.

Blackville, Alston & Newbery.—The extension from Sallys to Seivern, S. C., a distance of 13 miles, has been completed. Surveys have been made from Seivern to Balesburg, S. C., a distance of about 15 miles.

Brookfield.—About a mile of grading has now been completed on this road from Brookfield toward North Brookfield, N. Y. The road will be about seven miles long.

Buena Vista & Columbus.—The Chattahoochie Brick Co. has received the contract for grading the extension from Buena Vista to Columbus, Ala., to connect with the Columbus & Western divison at Columbus, Ga. This line will form part of the Central of Georgia's new line from Savannah to Birmingham via Americus and Columbus, Ga., this extension completing the line from Birmingham to Americus.

Cairo & Cape Girardeau.—A preliminary survey has been started from Beech Ridge, Ill., north of Cairo, northwesterly along the Mississippi River through Sante Fe and Thebes to East Cape Girardeau, a distance of about 20 miles. M. Brown is Engineer.

Central of Georgia.—The extension of the Eufaula & East Alabama from Clayton southwest to Ozark, Ala., has been opened for business as far as Louisville, 10 miles from Clayton, and track has been laid 10 miles further to beyond Elamville.

Chesapeake & Ohio.—About 96 per cent. of all classes of stock and bonds have accepted the reorganization plan. Receipts by Drexel, Morgan & Co. for first preferred, second preferred and common stock, on which all assessments have been paid, may now be exchanged for engraved reorganization certificates, as also receipts for series B, C, and 4 per cent. bonds, and also for currency 6 per cent. bonds.

Chicago, St. Paul & Kansas City.—The company has brought suit in the Circuit Court at St. Joseph, Mo., against the Kansas City, St. Joseph & Council Bluffs, to compel the latter to give it the right of way over their tracks within the corporate limits of the city of St. Joseph. The suit grows out of an ordinance passed by the Council a few months ago giving the Chicago, St. Paul & Kansas City right of way over the tracks, in accordance with the deed giving the right of way to the St. Joseph & Council Bluffs in 1867, which provided that roads entering the city from the north should use these tracks. The Kansas City, St. Joseph & Council Bluffs now claims that when the St. Joseph & Council Bluffs and the St. Joseph & Western were consolidated, forming the Kansas City, St. Joseph & Council Bluffs, the latter company was not bound by the ordinances governing the old roads.

Chippewa Valley.—Engineers will soon commence the survey of the road from Mt. Pleasant northwest to Chippewa Lake and thence to Big Rapids, Mich., a distance of 40 miles, and it is expected to complete about 20 miles this year. The road is to form part of the Toledo, Ann Arbor & North Michigan system. D. M. Mongo is President.

Cincinnati & Green River.—H. K. Buras has petitioned the Circuit Court of Casey County, Ky., for a Receiver, and G. B. Harper, Superintendent, has been appointed Receiver. The road extends from Yosemite to King's Mountain, Ky., 13 miles.

Cleveland & Canton.—It is stated that negotiations have been concluded with New York and Boston bankers for placing a large block of the first mortgage five per cent. bonds, recently authorized by the stockholders for changing the gauge to standard and providing for additional equipment. The bonds are to the amount of $2,000,000, and are a first and only mortgage on 161 miles of road at a rate of $12,500 per mile, in addition to which the bonds cover 52 acres of terminal property in Cleveland valued at $1,500,000. The Canton terminals are estimated as being worth $300,000.

Columbia, Newberry & Laurens.—The grading between Columbia and the Broad River, is now being finished, and the piers for the bridge over the river are being erected. The contract for the superstructure will soon be let. The road is under contract to be finished to Newberry, S. C., a distance of 42 miles, by Oct. 1, and about 20 miles from Columbia have been graded. Between Newberry and Spartanburg, a distance of 97 miles, only preliminary surveys have been made.

Decatur, Chesapeake & New Orleans.—The contract has been let for that part of the road from Decatur, Ala., to Shelbyville, Tenn., 76 miles, and grading will soon commence.

Dodge City, Montezuma & Trinidad.—It is expected to have the road from Dodge City to Montezuma, Kan., 30 miles, completed and opened for traffic about Aug. 1. The contracts for constructing 100 miles from Montezuma toward Trinidad, Col., will be let in September, probably.

Duluth, South Shore & Atlantic.—Parties interested in the Canadian Pacific have secured a controlling interest in this road.

Elmira, Cortland & Northern.—It is reported that a survey is being made from Elmira down the Susquehanna Valley to Williamsport, N. Y., for a contemplated extension to connect with the Philadelphia & Reading and give that road a northern outlet for its coal trade.

Florida Central & Peninsula.—This company, which is a reorganization of the Florida Railway & Navigation Co., has a capital stock of $26,100,000, of which $1,600,000 is first preferred accumulative five per cent. stock: $4,500,000 of second preferred five per cent. stock; and $20,000,000 of common stock; there are $3,000,000 of five per cent. 30-year gold bonds.

Georgia, Florida & Southern.—A meeting was held in Perry, Ga., last week, to take steps toward securing a branch of the Georgia, Florida & Southern to Perry. A committee was appointed to consult with the officers of the road.

Georgia Southern & Florida.—The tracklaying has now been completed to a point about 55 miles south from Macon, Ga., and is being rapidly completed to Valdosta, 95 miles further south. T. J. James & Co., of Atlanta, Ga., and Pittman, Baker & Co., are the principal contractors.

Grand Forks & Dakota Southern.—The company is securing right of way for its road, which has been surveyed from Grand Forks south along the Red River to Fargo, Dak.

Grand Trunk.—A short branch is be ing constructed from Peterborough, Ont., north to Chemu ng Lake, about eight miles.

Hawkinsville, Americus & Eastman.—The contract for building part of the road has been let to S. R. Storey, of Macon, Ga., and part of the grading o utfit has been shipped, ready to commence work.

Kanawha & Coal River.—The road, which is standard guage, and extends from the Kanawha River up Davis Creek to the mines of the Black Band Iron & Coal Co., is to be sold at public auction in Charleston, W. Va., Aug. 23, by the commissioners appointed in the suit of the American Loan & Trust Co., of New York, against the company.

Louisville, St. Louis & Texas.—Tracklaying has now been completed from Owensboro, through Cloverport to Stephensport, Ky., a distance of 50 miles from Owensboro.

Macon & Dublin.—A mortgage for $12,000 per mile has been executed on the 54 miles from Macon to Dublin, Ga., and it is thought that construction will soon commence. H. S. Morse, of Macon, is General Manager.

Maine Central.—The directors have authorized the President to ratify the proposed 99-year lease of the Portland & Ogdensburg, and the directors of the Portland & Ogdensburg have also voted to authorize the lease. The matter will now have to be ratified by the Maine Central stockholders and the City of Portland, as the city owns a controlling interest in the Portland & Ogdensburg.

Maquoketa, Hurstville & Dubuque.—Incorporated in Iowa, with a capital stock of $500,000, to construct a road from Maquoketa northerly toward Dubuque, a distance of about 30 miles.

Maysville & Big Sandy.—The road was opened for traffic on Monday from Ashland to Maysville, Ky., a distance of 82 miles, and tracklaying is being rapidly completed to Newport, opposite Cincinnati. The road connects at Ashland with the Chesapeake & Ohio, and at Maysville with the Kentucky Central.

Mexican Pacific Coast.—Mr. W. H. McWood, the concessionairy of this road, has informed the *Mexican Financier* that the construction of this line, which is to extend from the head of the Gulf of California, where it will connect with the Southern Pacific, passing through Hermosillo, on the Sonora road, Alamos, Sinaloa City, Culiacan, Mazatlan, Rosario, and ending in Tepec, where it will connect with the Mexican Central's branch to San Blas on the Pacific, is to be commenced between Mazatlan and Tepec at once. This covers a distance of some 225 miles, and it is stated that rails and steel ties for the first 100 miles are shipped to arrive in September.

Mazatlan is the principal steamship port in Western Mexico, and Tepec is a manufacturing town of some importance, while Rosario is the centre of a very rich mining locality.

This line when completed will make the most direct line of communication between Arizona and California with the country north, and the City of Mexico. The coast lands of Sinaloa are very rich agriculturally and moderately well wooded, as is shown by the fact that the Sinaloa & Durango Railroad, which is succeeded by the Pacific Coast road, are buying hardwood ties at 25 cents, Mexican, each. The mountains are well, covered with pine, fir, and cedar, and contain many refractory silver ores. The officers of the road are: Eaton N. Frisbee, President; General James S. Negeley, Vice-President; W. H. McWood, General Manager; E. A. Warner, Chief Engineer. Mr. Lucius Clark, of South Bend, Indiana, is president of the construction company which will build the line. The *Pacific Lumberman* is in receipt of a letter from that city saying that Mr. Warner has already received over 500 applications for positions in his parties. Some are offering their services at $35 per month and expenses for work that will be both unpleasant and dangerous. The maximum payment for transit men will be, according to the letter, $110 in Mexican silver. There are now in Mazatlan a number of civil and mechanical engineers looking for work.

Mobile, Hattiesburg & Jackson.—The two companies of this name in Alabama and Mississippi have consolidated as the Mobile, Jackson & Kansas City, and it is stated that construction will be energetically pushed.

Montana Central.—Track was laid into Butte, 73 miles from Helena, Mont., July 12, and the event was celebrated with a dinner to the officials of the road, etc.

Montgomery & Florida.—The road was sold in Montgomery this week, under a decree of foreclosure, and was bought in by David S. Boody for $194,000, in the interest of the bondholders. After the re-organization, steps will be taken to widen it to standard gauge, and extend it south.

New York, Mahoning & Western.—It is stated that the Allegheny Construction Co. has been formed to complete the building of the road.

Northern Pacific.—The President has accepted two miles of the Cascade Branch in Washington Territory, embracing the Stampede Tunnel and its approaches.

Oregon Railway & Navigation Co.—A contract for building part of the extension to the Cœur d'Alene mines in Montana, has been let to Joseph Hanson, who has just completed a contract on the Montana Central, and work upon it will begin immediately.

Pennsylvania.—It is reported that the road contemplates building an extension south to Morgantown, in the northern part of West Virginia, on the Baltimore & Ohio.

Pemberton & Hightstown.—A meeting of the Union Transportation Co., which is to operate this road, is to be held to-morrow, for organization, and to effect the lease. It is the intention to open the road for business on Monday, July 30, with a train service similar to that in operation prior to the abandonment.

Pomona & Elsinore.—The road has now been graded from Pomona to Temecula Cañon, Cal., about 25 miles, and 5 miles has also been completed at Elsinore, on the California Southern. The contract for constructing the line from Temecula to Elsinore, about 12 miles, will soon be let. John B. Treadwell, Chino, Cal., is Chief Engineer.

Surveys are still in progress on the San Diego & Elsinore, which is an extension of this road from Elsinore to San Diego, a distance of 60 miles.

Port Jervis, Monticello & New York.—The company brought suit last week against the New York, Lake Erie & Western in the Supreme Court of Orange County or $50,000 damages for interruption of traffic and general injury to its interests. An injunction is also to be applied for to restrain the Erie from denying the road the use of terminal facilities at Port Jervis, which the Erie allowed the Monticello until a few months ago, when the Erie excluded the road, claiming it needed all its Port Jervis accommodations for its own traffic.

St. Albans & Coal River.—Chartered in West Virginia to build a road from St. Albans, on the Great Kanawha River, to coal fields in Raleigh County.

St. Paul, Minneapolis & Manitoba.—Tracklaying has now been completed from Willmar, for 30 miles; and from Watertown southwest toward Huron, Dak., for 22 miles. A branch is also being graded from Cando, northwest toward St. Johns, Dak., a distance of 42 miles. Between Alexandria, Dak., and Barnesville, Minn., 7.6 miles, the grades are being reduced to a maximum of 30 ft. per mile. Eighty-five feet has been the maximum hitherto.

Sault Ste. Marie & Southwestern.—Surveys are being made from Tomahawk to Unity, Wis., on the Wisconsin Central, and when completed between these points they will be continued on to Rhinelander.

Seattle, Lake Shore & Western.—The northern branch has now been completed to Snohomish City, Wash. Ter., and is being rapidly pushed toward British Columbia, where it will connect with a branch of the Canadian Pacific, to be built south to connect with it.

Seattle, Lake Shore & Eastern.—Grading on the division west from Spokane Falls toward Davenport, W. T., has now been completed for 20 miles.

Sioux Falls & Northern.—It is reported that the St. Paul, Minneapolis & Manitoba has rescinded the contract made with the company for the operation of its road, between Palisades and Sioux City, upon its completion. It is also reported that since the action of the Iowa Railroad Commissioners in reducing tariffs, those who were to furnish the funds have declined to do so.

Texas & Pacific.—The contract has been let to W. Porslund and W. L. Sloan to build a new car shop at Marshall, Tex., and a number of section houses. The car shop is to cost about $5,000, and will be 54 × 300 ft.

Tobique Valley.—The contract has been let to John E. Stewart, of Andover, N. B., for constructing 14 miles of this road. Grading will be commenced in August, and the road completed this year.

Trinidad & Denver.—The road, which extends from Trinidad to El Moro, Colo., will be sold at public auction at the County Court House in Denver on Sept. 3, to satisfy a trust deed made to the Security Safety Deposit and Trust Co.

Union Pacific.—Tracklaying has been commenced on the Salina, Lincoln & Western, and about 5 miles of track has been laid from near Waldo, Kan., toward Plainville. Grading is being rapidly pushed on the Lincoln & Colorado from Plainville toward Colby, Kan.

Wheeling, Canonsburg & State Line.—Organized in Canonsburg, Pa., to build a road from Canonsburg, on the Pittsburgh, Cincinnati & St. Louis, west through Washington County to a connection with the recently organized Wheeling, Wellsburg & State Line, which is to build the line to Wheeling, connecting there with the Union Railroad Bridge and the South Pennsylvania & Ohio.

Wheeling & Lake Erie.—A force of about 300 men is at work on the extension from Bowerstown, O., to Wheeling, W. Va., and work is being pushed as rapidly as possible in order to prevent other roads building over this route. The South Pennsylvania & Ohio has, however, let a contract to Paige & Carey for building a line from Martin's Ferry via Hopedale and Bowerstown to Sherrodsville, O., which parallels the line of the Wheeling & Lake Erie for many miles. It is also said that they hold the rights of way at several strategic points.

Wyoming Midland.—The survey for this road is now being made from Eldorado, at the northern boundary of Wyoming, south to Landor, with a branch westwardly up Wind River. It is expected to have all surveys completed this year, and commence construction next spring.

TRAFFIC AND EARNINGS.

The Inter-state Commerce Commission.

The hearing at Elberon, N. J., on emigrant traffic was continued on July 12. The testimony reported gives little that is new. The Chicago-Council Bluffs lines pay $4.50 commission per passenger. Officers of the New York Central, Erie and Pennsylvania testified to the decent manner in which they treat passengers on their trains.

The hearings of cases now pending was resumed in Washington July 17. Among the cases to be heard is the complaint of Frank L. Hurlburt against the Pennsylvania, alleging excessive and unreasonable charges in the transportation of rough hub blocks in carloads, and also discriminating between rough and manufactured hub blocks. The complainant also makes a similar charge against the Lake Shore & Michigan Southern, and a hearing of this case will also be given. Another case is the complaint of the coal companies alleging discrimination on the part of several railroads against coal mined west of Pittsburgh and shipped to Cleveland, as compared with coal mined east of Pittsburgh. The charge of discrimination by the Philadelphia & Reading against the International Express Co., in favor of the Adams Express, was set for Thursday, and the charges brought by the Spartanburg (S. C.) Board of Trade against some twenty railroads in the South and West for Friday.

Traffic Notes.

The local passenger fares on the Minneapolis & Pacific division of the St. Paul, Minneapolis & Sault Ste. Marie have been reduced from four to three cents a mile.

Lake rates are now on the basis of 1¾ cents per bushel on wheat from Chicago to Buffalo.

Dispatches from the West say that none of the Iowa railroads are quoting the rates fixed by the Commissioners. The Commissioners hold that the new tariff went into effect on July 11, and it is declared that numerous suits will be brought against the companies.

The advance in rates from the Atlantic seaboard to Colorado points which was announced has not been put in effect.

Excessive Excess.

The wholesale merchants of St. Paul and Minneapolis have filed a complaint with the State Railroad Commissioners alleging exorbitant extra baggage rates on various roads. They say that where a salesman visits two towns a day, his hotel bill is $2.50 a day, his transportation 50 cents, and his excess baggage charges $2.50. It is admitted that the charge for long distances may not be excessive, but more nearly proportionate rates for short distances are demanded. The cost of carrying 1,000 lbs. excess baggage from St. Paul to St. Vincent is $16.15, or 4 cents per mile. To carry the same baggage the same distance, stopping at each station in order, the charge is $74, or 19 cents per mile. These are the lowest rates made, and are obtainable only by the use of excess baggage books.

Trunk Line Rates.

Live stock and dressed beef rates from Chicago to the seaboard have been further slightly reduced from the extremely low figures quoted last week. A Chicago paper of the 15th gives some of the particulars of the fighting as follows:

"Cattle rates have touched bottom. The Vanderbilt lines ceased to make further reductions when 5½ cents, Chicago to New York, was reached. The Pennsylvania went as low as 5 cents to New York, 3 cents to Philadelphia, and two cents to Baltimore, and then stopped. The Erie, Grand Trunk and other roads went out of the cattle business some time ago. The war on dressed beef rates, however, is continued with undiminishing vigor. The Erie resumed the slaughter yesterday morning by making the rate 7 cents, Chicago to New York. This was promptly met by the Pennsylvania and Vanderbilt lines. The latter also reduced the Boston rate to 17 cents. The tariff is now only 1½ cents higher than the cattle rate by the Vanderbilt, and the Erie will probably continue to reduce until it is the same. The latter road is making no special efforts to secure the business at the prevailing low rates, and rather seems to discourage shipments by its line. It refuses to guarantee quick service as heretofore, and is understood to carry the dressed beef on regular freight trains. The effect of this is that the Erie, which up to a week ago had the bulk of the business, now gets little, having received only one car-load yesterday. The bulk of the New York business is going by the Pan-Handle and the Wabash, the former getting 21 carloads yesterday and the latter 24. The Grand Trunk continues to carry the bulk of the Boston and New England dressed beef, although it has not reduced the rate below 26½c., which shows that it is favored by the dressed-beef shippers as a reward for the services rendered them. The prospects are that as soon as the dressed beef war has spent itself and rates have reached bottom, which will be in a day or two, the fight will be transferred to the provision and other traffic. Provision rates went down 2 cents yesterday by all lines, making the rate 18 cents per 100 lbs. This is a total reduction of 12 cents since the war was inaugurated. Live hogs, which generally take the rate of provisions, were also reduced to 18 cents, Chicago to New York. Grain rates are still maintained at 25 cents per 100 lbs., but it is believed they will come down to or below the provision rates within a few days, it being impossible to keep them above provisions."

On Tuesday the Erie reduced the rate on dressed beef to six cents. On Monday the Chicago & Grand Trunk put in effect its restored rate of 30 cents.

Railroad Earnings.

The comparative statement of the Richmond & Danville system for the month of June is as follows:

	1888.	1887.	Inc. or Dec.
Richmond & Danville:			
Gross earnings	$295,451	$296,561	D. $1,110
Oper. expenses	190,779	191,292	D. 573
Net earnings	$104,672	$105,268	D. $596
Virginia Midland:			
Gross earnings	$151,079	$137,667	I. $13,412
Oper. expenses	81,583	76,537	I. 5,046
Net earnings	$69,496	$61,130	I. $8,366
Western North Carolina:			
Gross earnings	$42,572	$59,950	D. $17,378
Oper. expenses	38,074	51,225	D. 16,151
Net earnings	$4,797	$5,725	D. $1,927
Char., Col. & A.:			
Net earnings	$49,703	$50,833	D. $1,130
Oper. expenses	41,726	48,765	D. 7,039
Net earnings	$7,477	$2,068	I. $5,905
C. & Green.:			
Gross earnings	$32,556	$25,038	I. $7,518
Oper. expenses	29,226	37,666	D. 8,440
Net earnings	$3,330	def.$12,627	I. $15,957
Total net inc			I. 28,408

The following is the May statement of the Oregon Improvement Co.:

	1888.	1887.	Increase.
Gross earnings	$452,154	$365,733	$86,421
Oper. expenses	312,593	243,626	68,967
Net earnings	$139,561	$122,107	$17,454

The statement of the Mexican Central for June shows:

	1888.	1887.	Inc. or Dec.
Gross earnings	$510,978	$394,743	I. $116,235
Oper. expenses	349,945	210,985	I. 138,960
Net earnings	$161,033	$183,758	D. $22,724

Guadalajara Division—Gross $39,549, net $22,534.

Coal.

The coal and coke tonnage of the Pennsylvania originating on lines east of Pittsburgh and Erie for the week ending July 7, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending July 7	171,488	59,397	230,885
Total for year 1888 to date	5,994,049	1,988,777	7,982,326
Total for year 1887 to date	5,285,524	1,684,371	7,069,895

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1888.	1887.	Inc. or Dec.
Total for week ending July 7	29,845	17,145	I. 12,699
Total for year to July 7	780,088	889,705	D. 109,616

The Cumberland Coal trade for the week ending July 14 amounted to 62,859 tons, and for the year to that date, 1,780,620 tons.

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette:*

Atchison, Topeka & Santa Fe..354
Baltimore & Ohio..... 48
Buffalo, N. Y. & Phil..... 142
Buffalo, Rochester & Pittsburg. 64
Central Pacific..... 291
Chesapeake & Ohio 372
Chesa., Ohio & Southwestern..372
Chicago & Alton..... 142,148
Chic., Burlington & Quincy142, 264
Chic., Mil. & St. Paul 230
Chic., Rock Island & Pacific...392
Chic., St. L. & Pitts 291
Chic. & West Michigan 392
Cincinnati & Muskingum Val..330
Cin., N. O. & T. Pac..... 142
Cleve., Colum., Cincin. & Ind..214
Delaware, Lack. & Western..148
Denv. & R. G. West..... 291
Det., Lansing & Northern.....414
Elizabeth, Lex. & Big Sandy...372
Fitchburg..... 33
Grand Rapids & Indiana... .. 291
Illinois Central.....198
Kansas City, Clinton & Spring.354
Kansas C., Ft. S. & Gulf.....306
Kentucky Central..... 372
Lake Erie & Western.....322
Lake Shore & Mich. South.....322
Lehigh Valley..... 88
Louisv., New Albany & Chic...330
Michigan Central.....322
Norfolk & Western 98
Northern Central 132
Pennsylvania.....159, 164
Philadelph'a Co 306
Pittsb., Cincin & St. Louis.....330
Pitts., Fort Wayne & Chicago..392
Richmond & Danville..... 64
Rome, Watertown & Ogdens... 16
St. Louis, Alton & Terre Haute.392
St. Louis & San Francisco.....330
St. Louis, Vandalia & T. Haute. 64
Toledo, Ann Arbor & N. Mich..330
Union Pacific..... 280
Wrightsville & Tennille..... 23